

2024 UTME MODEL BIOLOGY QUESTIONS

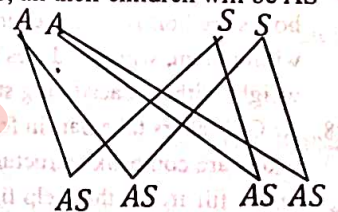
1. The cilia in paramecium function for (A) locomotion (B) respiration (C) excretion (D) defence
2. The Euglena may be classified as a plant due to its possession of (A) gullet (B) flagellum (C) chloroplast (D) pellicle
3. Which of the following is the terminal portion of the alimentary canal of a mammal? (A) oesophagus (B) stomach (C) Rectum (D) colon
4. An organism that dwells on the remains of a dead plant is a/ an (A) parasite (B) saprophyte (C) enigma (D) commensal
5. A Secchi disc is used in the determination of (A) rainfall (B) tides (C) waves (D) turbidity
6. The blood vessel which carries digested food from the small intestine to the liver is the (A) renal artery (B) hepatic portal vein (C) hepatic artery (D) renal vein
7. Nitrogen is utilized in (A) formation of ATP (b) formation of glucose (C) photosynthesis (D) formation of amino acids
8. Which of the following organs produces bile? (A) Gall bladder (B) pancreas (C) spleen (D) liver
9. Which part of the brain is concerned with reflexes controlling the rate of heartbeat and breathing? (A) medulla (B) cerebrum (C) cerebellum (D) pineal body
10. Which of the following is cold-blooded? (A) cat (B) lizard (C) whale (D) bird
11. A character shown by an organism is due to the effects of (A) hormones only (B) genes only (C) genes and environment (D) environment only
12. A tapeworm has no alimentary canal because (A) it is autotrophic (B) it does not feed (C) it absorbs digested food (D) it has no enzymes
13. External ears of mammals consist of (A) pinna and tympanum (B) pinna only (C) pinna and auditory meatus (D) meatus only
14. Jointed skeleton is absent in (A) spider (B) snail (C) spider (D) millipede
15. What is the genotype of a child from a man with normal haemoglobin (AA) and a woman who has sickle-cell haemoglobin (SS)? (A) AA (b) SS (C) AS (D) O
16. Fehling's solution will readily change colour from blue to a reddish colour when it is (A) mixed with sugar solution in the cold (B) warmed by itself (C) mixed with a reducing sugar in the cold (D) warmed with a solution of reducing sugar
17. The axial skeleton of a mammal does not include the bones of the (A) skull (B) tail (C) limbs (D) back
18. Which of the following elements is essential for the formation of haemoglobin? (A) sodium (B) Iron (C) calcium (D) potassium

19. Which of the following is an example of discontinuous variation? (A) skin colouration (B) left-handedness (C) height (D) weight
20. Most cells in higher animals retain their power of division except (A) germ cells (B) nerve cells (C) erythrocytes (D) leucocytes
21. A severe deficiency of thyroxine results in (A) diabetes mellitus (B) sexual underdevelopment (C) cretinism (D) gigantism
22. The division thallophyta comprises (A) ferns and mosses (B) algae and fungi (C) mosses and liverworts (D) fungi and ferns
23. For an animal to have diastema, it must lack (A) incisors (B) molars (C) canines (D) premolars
24. Parenchyma cells serve as supporting tissue when they (A) contain crystals (B) become turgid (C) become flaccid (D) lose chloroplasts
25. The mineral nutrient that easily gets leached out of the soil is (A) phosphorus (B) nitrate (C) calcium (D) magnesium
26. Hydra removes undigested food by (A) passing it through the mouth (B) passing it through the anus (C) passing it through the body surface (D) passing it through its contractile vacuole
27. A feature which adapts birds to flight is the possession of (A) scales (B) legs (C) light bones (D) pointed beaks
28. The gill rakers of fishes take part in (A) feeding (B) cellular respiration (C) swimming (D) diffusion
29. Epigeal germination can be found in (A) sorghum (B) maize (C) millet (D) groundnut
30. The greatest contribution to genetic studies was made by (A) Robert Hooke (B) Gregor Mendel (C) Charles Darwin (D) Thomas Morgan
31. Neurons that receive stimuli from the body or internal organs are called (A) motor neurons (B) sensory neurons (C) efferent neurons (D) relay neurons
32. Which of the following stores carbohydrate as glycogen? (A) *spirogyra* (B) *Mangifera* (C) *Rattus* (D) *Chlamydomonas*
33. The sex-linked defect in which very slight cut produces severe bleeding is known as (A) anaemia (B) anorexia (C) haemophilia (D) haemolysis
34. A band of connective tissue linking two bones in a joint is known as (A) tendon (B) cartilage (C) synovial membrane (D) ligament
35. The speed of the wind can be measured with an instrument called (A) anemometer (B) hydrometer (C) wind vane (D) barometer
36. The organism that has a hydrostatic skeleton is (A) tilapia (B) Hydra (C) earthworm (D) Lizard
37. Fertilization in humans usually takes place in the (A) lower part of the uterus (B) upper part of the uterus (C) lower part of the oviduct (D) upper part of the oviduct
38. In mammalian males, the excretory and reproductive systems share the (A) ureter (B) testes (C) vas deferens (D) urethra
39. The dominant phase in the life cycle of a bryophyte is the (A) gametangium (B) sporophyte (C) gametophyte (D) prothallus
40. In the mammalian kidney, the Bowman's capsule is located in the (A) ureter (B) pelvis (C) cortex (D) medulla

SOLUTION

1. A: In paramecia, cilia are used for locomotion. These tiny, hair-like structures cover the surface of the cell and beat in coordinated patterns to propel the organism through its aquatic environment
2. C: *Euglena* exhibits characteristics of both plants and animals. The presence of chloroplasts in *Euglena* allows it to perform photosynthesis
3. C: Rectum is the terminal portion of the alimentary canal. It extends to the anus where faeces is eliminated from the body
4. B: A saprophyte is an organism that feeds on dead or decaying organic matter. These organisms, including many fungi and bacteria, play a crucial role in nutrient cycling
5. D: A secchi disc is a tool used to measure water transparency in lakes and oceans. It consists of a circular disk, typically white and marked with black and white quadrants, which is lowered into the water on a rope. The depth at which the disc is no longer visible is recorded as the secchi depth, providing an indication of water clarity.
6. B: The hepatic portal vein is the blood vessel which carries digested food from the small intestine to the liver

- NB:** it is also the only blood vessel that begins and ends with capillaries
7. D: Nitrogen is essential for the formation of amino acids which are the building blocks of protein, which are the building blocks of proteins. It is a key component of amino groups ($-NH_2$) in amino acids
8. D: The bile is produced in the liver and stored in the gall bladder
9. A: The medulla oblongata contains centers that monitor and adjust the rate and depth of breathing, as well as the heart contractions
10. B: Among the animals listed, the lizard is the only one that is cold-blooded. Unlike warm-blooded animals which regulate their body temperature internally, cold-blooded animals like lizards rely on external environmental conditions to regulate their body temperature
11. C: A character or trait exhibited by an organism is typically influenced by both genetics and environment
12. C: A tapeworm has no alimentary canal because it absorbs already digested food
13. C: The external ear of mammals typically consists of the pinna and the auditory meatus. The pinna is the visible outer part of the ear that helps to capture and direct sound waves into the ear canal. The auditory meatus is the passage that leads from the pinna to the ear drum
14. B: Snails do not have a jointed skeleton. Instead, they possess a hard shell for protection and a soft, muscular body
15. C: If the genotype of the parents are AA and SS, all their children will be AS



16. D: Fehling's solution changes from blue to red when warmed with a solution of a reducing sugar. Fehling's solution contains copper (ii) ions, which are reduced to copper (i) oxide, forming a red precipitate in the presence of reducing sugars like glucose or fructose
17. C: The axial skeleton comprises the skull, the sternum, the vertebral column and the ribs

- Note:** Limbs and limb girdles constitute the appendicular skeleton
18. **B:** Iron is a key component of the heme group in haemoglobin, which enables the binding and transport of oxygen. Without adequate iron, the body cannot produce enough healthy haemoglobin
 19. **B:** Skin, height and weight are examples of continuous variation while left handedness is an example of discontinuous variation.
 20. **B:** Nerve cells typically have limited capacity for division once they are fully differentiated. Unlike many other cell types that can regenerate or replace themselves, mature neurons do not undergo division, which makes nerve damage more challenging to repair
 21. **C:** A severe deficiency in thyroxine can result in cretinism. Cretinism is a condition characterized by severe physical and mental development delays, typically caused by inadequate thyroid hormone levels during infancy or early childhood
 22. **B:** Algae and fungi make up the thallophyta division
 23. **C:** Diastema is the gap left in the jaw as a result of absence of canines
 24. **B:** Parenchyma cells contribute to structural support mainly when they are turgid (firm and swollen with water), as their fullness helps maintain the rigidity and shape of plant tissues
 25. **B:** Due to its high solubility in water, nitrate can be washed away from the soil by rainfall or irrigation
 26. **A:** In hydra, undigested food is expelled through the mouth. Yes, the mouth serves as both the entry and the exit point for food and waste.
 27. **C:** Light bones aid flight in birds. These bones are hollow or have air spaces, within them, which reduces their overall weight without sacrificing strength
 28. **A:** Gill rakers take part in feeding. Gill rakers are comb-like structures located on the fill arches that help filter out and capture small particles from the water as it passes over the gills
 29. **D:** Sorghum, maize and millet exhibit hypogeal germination while groundnut exhibits epigeal germination. In hypogeal germination, the cotyledons remain below the soil surface and the shoot emerges from the soil while the cotyledons stay underground.

30. **B:** Gregor Mendel made the greatest contribution to genetic studies through his work on inheritance patterns in pea plants.
31. **B:** Sensory neurons are responsible for receiving stimuli from the body or internal organs and transmitting this information to the central nervous system
32. **C:** Plant store carbohydrate as starch while fungi and animals store carbohydrate as glycogen
33. **C:** This is known as haemophilia
34. **D:** Tendons connect muscles to bones while ligaments connect bones to other bones and provide stability and support to joints
35. **A:** Windvane measures the direction of wind while anemometer measures wind speed
36. **C:** Earthworms use a hydrostatic skeleton. Their body structure relies on fluid-filled compartments within their coelom to maintain shape and support
37. **D:** Fertilization typically occurs in the upper part of the fallopian tube (or oviduct). This region provides the optimal environment for the sperm and egg to meet and merge, leading to the formation of a zygote before it travels to the uterus for implantation
38. **D:** Yes, In mammalian males, the urethra is urinogenital in role
39. **C:** The dominant phase in the life cycle of a bryophyte is the gametophyte
NB: For Pteridophytes, the sporophyte is the dominant phase
40. **C:** In the mammalian kidney, the Bowman's capsule is located in the renal cortex. It is the part of the nephron where blood filtration begins.

BIOLOGY

2023 UTME MODEL

BIOLOGY

QUESTIONS

BIOLOGY

1. Taenia solium can be found in (a) pig (b) cow (c) goat (d) dog
2. Proboscis is a structure that is mostly found in (a) molluscs (b) amphibians (c) insects (d) reptiles
3. Which of the following is an adaptation for water conservation? (a) prominent stomata in leaves (b) spiny leaves

- (c) spongy mesophyll (d) broad leaves
4. The digestive enzyme that is present in the saliva is (a) renin (b) ptyalin (c) chymotrypsin (d) pepsin
5. Plants that have special structures for trapping and digesting insects are (a) saprophytic (b) carnivorous (c) parasitic (d) symbiotic
6. Which of the following is a waste product of an insect? (a) uric acid (b) mucilage (c) alkaloids (d) sweat
7. The sensory cell that responds to dim light is called (a) cone (b) rod (c) pupil (d) iris
8. The opening of the guard cells of the epidermis in plants is by the process of (a) diffusion (b) osmosis (c) active transportation (d) transpiration
9. In humans, excretion of isotonic urine is associated with (a) proximal convoluted tubule (b) distal convoluted tubule (c) Bowman's capsule (d) loop of Henle
10. The correct arrangement of food classes of the same quantity in the descending order of magnitude of energy values in animals is (a) protein, fats and oils, water and carbohydrates (b) carbohydrates, fats and oils, water and protein (c) fats and oils, carbohydrates, protein and water (d) water, fats and oils, carbohydrates and protein
11. Which of the following substances is not a complex carbohydrate? (a) starch (b) Glucose (c) cellulose (d) glycogen
12. The bacteria that convert soil nitrate into atmospheric nitrogen are called (a) nitrifying bacteria (b) denitrifying bacteria (c) putrefying bacteria (d) saprophytic bacteria
13. The main reason for immunizing children is to, (a) stimulate the production of blood (b) stimulate the production of antibodies (c) increase the production of white blood cells (d) destroy pathogens in their bodies
14. How do we justify the absence of digestive system in tapeworm? (a) it does not feed (b) it is too small (c) its body absorbs digested food (d) it has no enzymes
15. If a body has blood type O and his mother has blood type A, what is the likely genotype of his father? (a) AB (b) AO (c) BB (d) AA
16. The organism above is found in soils rich in (a) mud (b) sand (c) clay (d) humus

17. The branch of biology that deals with the principles of classification of organisms is known as (a) population dynamics (b) ecology (c) taxonomy (d) nomenclature
18. The presence of a large number of _____ is an evidence that a cell utilizes a lot of energy (a) Ribosomes (b) vacuoles (c) mitochondria (d) endoplasmic reticulum
19. Krebs's cycle occurs in the (a) nucleus (b) ribosomes (c) cytoplasm (d) mitochondria
20. A purple colour was obtained when sodium hydroxide solution and a drop of copper sulphate solution were added to a food substance. The food is likely to be (a) sugar (b) protein (c) fat (d) carbohydrate
21. A sample of wet soil of a given weight was heated to constant weight. The loss in weight is due to loss of (a) water (b) humus (c) water and humus (d) inorganic matter
22. Adenine pairs with thymine because (a) one is a purine with thymine because (a) one is a purine base and the other, a pyrimidine (b) they are both purines (c) they are both pyrimidines (d) the two occur in the same nucleic acid
23. What is the role of the red head in male Agama lizard? (a) To scare other males (b) for camouflaging against predators (c) to attract female lizards for mating purposes (d) for respiration
24. An example of an endospermous seed is (a) bean seed (b) cotton seed (c) cashew nut (d) maize grain
25. The movement response of cockroach away from a light source can be described as (a) positive phototaxis (b) positive phototropism (c) negative phototaxis (d) negative phototropism
26. If the cross of a red-flowered plant with a white-flowered plant produces a pink-flowered plant, it is an example of (a) codominance (b) convergent evolution (c) incomplete dominance (d) linkage
27. What is the number of alleles controlling blood groups in humans? (a) 2 (b) 3 (c) 4 (d) 5
28. In terms of the number individuals, which of the following taxa is the most inclusive? (a) specie (b) order (c) class (d) family
29. In the alimentary system of a bird, the function of teeth is carried out by the (a) tongue (b) gizzard (c) beak (d) crop
30. Exhaled air differs from inhaled air in that is (a) usually has more water vapour (b) is usually lower in temperature (c) has less amount of carbon (iv) oxide (d) often has more oxygen
31. The ability of a chameleon to change its colour is an adaptive feature for (a) attack (b) defence (c) display (d) attraction
32. Primary growth in plants is brought about by the activity of the (a) epidermis (b) endodermis (c) mesophyll (d) meristem
33. Which of the following processes is not an example of a reflex action? (a) sneezing (b) beating of the heart (c) blinking of the eye (d) reading
34. The following are examples of discontinuous variation except (a) sex type (b) skin colour (c) fingerprint (d) ability to taste PTC
35. Which of the following is an anabolic process? (a) excretion (b) photosynthesis (c) respiration (d) photolysis
36. Amoeba engulfs food particles by means of its (a) pseudopodia (b) food vacuoles (c) contractile vacuole (d) cytoplasmic membrane
37. The type of association in which one organism benefits and the other neither benefits nor suffers any harm is called (a) mutualism (b) parasitism (c) saprophytism (d) commensalism
38. Intercoastal muscles are found in the _____ region (a) limb (b) abdominal (c) head (d) chest
39. Meiosis involves the following except (a) exchange of genes (b) production of four daughter cells (c) production of cells with haploid number of chromosomes (d) production of cells with diploid number of chromosomes
40. The network of blood capillaries in the kidney capsule is referred to as (a) capsule (b) glomerulus (c) pelvis (d) pyramid

SOLUTION

1. **A:** Taenia solium inhabits pigs while Taenia saginata inhabits cows
2. **C:** The proboscis of insects is long, tubular mouthparts that they use for feeding. It can be adapted for various feeding habits, such as sucking nectar, piercing and sucking blood or lapping up fluids
3. **B:** The larger the surface area of the leaves the higher the transpirational water loss. Thus, spiny leaves reduce transpirational water loss to the barest minimum (broad leaves allow huge water loss in this sense). Also, the higher the number of stomata in leaves, the higher the rate at which water is lost.
4. **B:** The digestive enzyme in saliva is ptyalin. When you eat, ptyalin mixes with the food as you chew and it begins to break down the complex carbohydrates (e.g starch) into simpler sugars (e.g maltose)
5. **B:** Plants that have special structures for trapping and digesting insects are known as insectivorous / carnivorous plants. Examples are Venus flytrap, Pitcher plants, Sundews, Bladderworts and Butterworts
6. **A:** In insects, uric acid serves as the primary waste product resulting from the breakdown of nitrogenous compounds. Unlike mammals and birds, which primarily excrete nitrogenous waste in the form of urea, insects have a unique excretory system that produces acid as a more efficient means of conserving water
7. **B:** There are two types of photoreceptor cells in the retina of the eye-the rod cells and the cone cells. Rod cells function in lower light (dim light) better than cone cells. However, the rod cells don't permit detection of colours while the cone cells let us see colours
8. **B:** Stomata open when the guard cells are turgid and close when the guard cells are flaccid. The turgidity and the flaccidity of guard cells depends on the osmotic concentration of the guard cells.
9. **A:** The concentration of the urine in the nephron depends on the permeability of the tubules. In the proximal convoluted tubule, the urine is isotonic
10. **C:** Be reminded that fats and oils contain a greater amount of energy than an equal quantity of carbohydrates. Thus, in descending order of magnitude of energy values, we have:
Fats and oils > Carbohydrates > Proteins > Water
11. **B:** Complex carbohydrates are composed of long chains of sugar molecules. They are considered 'complex' because their molecular structure is more intricate compared to simple carbohydrates (monosaccharides and disaccharides) Examples of

- complex carbohydrates include starch, cellulose, glycogen and chitin
12. **B:** The bacteria that convert soil nitrate into atmospheric nitrogen are called denitrifying bacteria e.g *Pseudomonas denitrificans*
 13. **B:** Immunization protects individuals by stimulating the production of specific antibodies against particular pathogens. Antibodies are proteins produced by the immune system in response to the presence of antigens
 14. **C:** Tapeworms do not possess digestive system because their bodies absorb already digested food
 15. **B:** For a child to have type O, the blood types of the parents must be AO and AO, BO and BO, AO and BO or O and O
Note that the blood type of the mother quoted as 'A' in this question definitely refers to AO (blood type A can be AA or AO)
 16. **D:** The organism represented by the diagram an earthworm.
Earthworm are found in soils that are rich in humus due to the ample organic matter, which serves as their primary food source
 17. **C:** Taxonomy is the science of classification, particularly the classification of organisms into a hierarchical system based on their similarities and evolutionary relationships
 18. **C:** When a cell utilizes a lot of energy, it must have an appreciable number of mitochondria. Recall that a mitochondria is a power house of the cell
 19. **D:** Krebs's cycle, also known as the citric acid cycle or the tricarboxylic acid cycle, occurs in the mitochondria of eukaryotic cells. The Krebs's cycle is a key component of cellular respiration
 20. **B:** The illustrated test describes the Biuret test for Protein
The other tests for protein are Millon's test and xanthoproteic test
 21. **C:** When a wet soil sample is strongly heated to a constant weight, both the water and the humus in the soil will be lost
 22. **A:** Two purines do not pair, neither do two pyrimidines. A purine pairs with the appropriate pyrimidine
Adenine and guanine are purines while cytosine and thymine are pyrimidines. In

- DNA, adenine pairs with thymine while guanine pairs with cytosine
Note: In RNA, thymine is replaced by uracil.
23. **C:** The red head in male Agama lizards serves to secure mate (attract female lizards)
 24. **D:** Endospermous seeds are seeds that have endosperm, a nutrient-rich tissue that surrounds and nourishes the developing embryo. Examples are maize, rice, wheat, castor and coconut
 25. **D:** -Generally, any movement 'towards....' is positive while any movement 'away from...' is negative
 - Since the cockroach moves away from the source of light, the answer is either negative phototropism or negative phototaxis, right?
 - While tropism is just a growth response (of a plant), taxis involves the whole body movement of the organism (just as the whole body of the cockroach moves in this case)

Thus, the correct answer is negative phototaxis
 26. **C:** This illustrates incomplete dominance. In incomplete dominance, instead of one allele to completely mask the other, the effects of both are partially expressed, resulting in a new phenotype that is different from both parents
 27. **B:** The number of alleles controlling blood groups in humans is three (A, B and O), These alleles determine the presence or absence of specific antigens on the surface of red blood cells, leading to four blood types: A, B, AB and O
 28. **C:** The most inclusive taxon is the kingdom while the least inclusive is the species. In descending order of inclusivity, the taxa are arranged thus: Kingdom > Phylum /division > Class > Order > Family > Genus > Species
 29. **B:** Birds don't have teeth. They use their gizzard to mechanically grind the ingested food substances
 30. **A:** - Exhaled air usually has more water vapour than inhaled air
 - Exhaled air is usually higher in temperature
 - Exhaled air has greater amount of CO_2
 - Exhaled air has less oxygen
 31. **B:** Chameleons lack traits such as sharp teeth or claws, venom and speed. They must rely on being able to blend into

- their surroundings well to evade predators (which is a defensive mechanism)
32. **D:** Primary growth in plants is controlled by root meristems and shoot apical meristems
Note: While apical meristems control primary growth, lateral meristems control secondary growth
 33. **D:** Reading is not a reflex action, it is voluntary
 34. **B:** Skin colour is a continuous variation while fingerprint, sex type and ability to taste phenylthiocarbamide (PTC) are discontinuous variations
 35. **B:** - Anabolic processes build complex molecules from simpler ones (e.g Photosynthesis and protein synthesis)
 - Catabolic processes break down complex molecules into simpler ones (e.g digestion and cellular respiration)
 36. **B:** When an amoeba engulfs food through phagocytosis, a temporary vacuole, known as the food vacuole, is formed.
Once the food vacuole is formed, it fuses with lysosomes. The lysosomes enzymes start breaking down the engulfed food into simpler molecules
 37. **D:** - In mutualism, both organisms benefit
 - In parasitism, one organism benefits while the other is harmed
 - In commensalism, one benefits while the other neither benefits nor suffers any harm
 38. **D:** Intercostal muscles are located between the ribs in the human body. These muscles are essential for breathing because they help in the expansion and contraction of the ribcage during the respiratory process.
 39. **D:** In meiosis, four daughter cells are produced at the end of the process. The four daughter cells resulting from meiosis are haploid, meaning they contain half the number of chromosomes compared to the parent cell.
 40. **B:** The glomerulus is a network of tiny blood vessels known as capillaries. It plays a crucial role in the first step of urine formation (which is known as glomerular filtration)

BIOLOGY

2022 UTME MODEL

BIOLOGY

QUESTIONS

1. A circulatory system is very essential in mammals but not in smaller organism like amoeba because (a) Amoeba lives in fresh water (b) Diffusion is sufficient to transport materials in Amoeba (c) Amoeba lacks blood containing haemoglobin (d) Amoeba exhibits anaerobic respiration
2. In vascular plants, the sieve tubes and companion cells are present in the (a) phloem (b) cambium (c) xylem (d) cortex
3. The stomata of leaves are similar in function to the function (a) trachea of toads (b) pharynx of humans (c) spiracle of insects (d) scales of fishes
4. The genetic make-up of organism is described as (a) chromosome (b) mutation (c) genotype (d) phenotype
5. The study of how and why population size change overtime is (a) population cycle (b) population estimation (c) population ecology (d) population dynamics
6. The soil with highest water-retaining capacity is (a) loamy soil (b) clayey soil (c) sandy soil (D) stoney soil
7. An example of a poikilothermic organism (a) bird (b) rabbit (c) rat (d) lizard
8. The following variation are morphological except (A) size (b) colour (c) ability to taste PTC(d) weight
9. The process by which complex substances are broken down into simpler ones is referred to as (a) photosynthesis (b) respiration (c) anabolism (d) catabolism
10. Taenia solium can be found in (A) fish (b) cow (c) pig (d) goat
11. The plants that grown areas with moderate supply of water are referred to as (a) mesophytes (b) hydrophytes (c) xerophytes (d) epiphytes
12. Movement of manufacture food in a plant occur during (a) transpiration (b) translocation (c) osmosis (d) diffusion
13. The blood circulatory system of vertebrates consists of (a) heart, vena cava, arteries and veins (b) heart, arteries, veins and capillaries (c) heart, aorta, arteries and veins (d) heart, aorta, capillaries and veins
14. Which of the following forms about 55% of the volume of the blood in man? (a) erythrocytes (b) leucocytes (c) platelets (d) plasma
15. The transfer of pollen grains from the anther to a stigma is (a) fertilization (b) propagation (c) placentation (d) pollination
16. Which of the following is caused by Treponema pallidum? (a) Syphilis (b) Leprosy (c) Gonorrhoea (d) Tuberculosis

17. The clumping together of red blood cells is (a) transfusion (b) fusion (c) compatibility (d) agglutination
18. One of the adaptations of Cactus opuntia to conserve water is the reduction of (a) flower size (b) internodes (c) leaves of spine (d) stem of leaves
19. The blood group which is regarded as the universal recipient is (a) O (b) AB (c) A (d) B
20. In which of the following levels of classification are the members most similar? (a) phylum (b) order (c) Genus (d) Species
21. The opening of the stomata of the epidermis in plants is by the process of (a) transpiration (b) active transport (c) osmosis (d) diffusion
22. Which of the following organs are used for gaseous exchange in a mature toad? E (a) skin, lungs and mouth (b) Gills, lungs and ear drum (c) mouth, skin and gills (d) lungs, mouth and ear drum
23. Which part of the nephron is associated with ultra-filtration? (a) Distal convoluted tubule (b) Bowman's capsule (c) collecting duct (d) proximal convoluted tubule
24. Which of the following is not a complex carbohydrate? (a) glucose (b) glycogen (c) starch (d) cellulose
25. Ascaris lumbricoides is a parasitic (a) elastic worm (b) flat worm (c) arthropod (d) round worm
26. The absence of alimentary canal in the parasitic flatworm can be attributed to the fact that (a) it has suckers on the scolex (b) it does not feed (c) it has no enzymes (d) its body absorbs digested food
27. Rhizobium which lives in the root nodules of leguminous plants is an example of the association known as (a) saprophytism (b) mutualism (c) epiphytism (d) mutualism
28. The gene is that is only located on X-chromosomes is said to be (a) expressed in males only (b) dominant (c) expressed in females only (d) sex linked
29. The epidermis of a leaf is considered an example of a tissue because the cells (a) allows water to enter them by osmosis (b) allow sunlight to pass through (c) all possess a similar structure and function (d) are covered by a waxy cuticle
30. The pulmonary circulation involves movement of the blood to and from the (a) brain (b) kidneys (c) lungs (d) liver
31. Which of the following substances must be present in the soil for the growth of a healthy green plant? (a) carbon (b) glucose (c) salts (d) magnesium
32. Excess carbohydrates can be stored in the muscles in the form of (a) lipids (b) cellulose (c) glycogen (d) chitin
33. Which of the following digestive enzymes would be greatly affected if the liver fails to produce bile? (a) protease (b) lipase (c) cellulose (d) amylase

34. The appropriate food to be given to a child that suffers from kwashiorkor is (a) pear (b) bread (c) garri (d) beans
35. Which of the following instruments is used for measuring air pressure? (a) Secchi disc (b) photometer (c) barometer (d) hygrometer
36. The primary cause of species endangerment is (a) acid rain (b) exposure of hazardous wastes (c) increase in temperature (d) disappearing habitats
37. Which of the following diseases is transmittable through genes? (a) Presbyopia (b) Diabetes (c) sickle cell anaemia (d) HIV/AIDS
38. Bees are of great importance to the farmer because they (a) provide him with honey (b) sting crop pests to death (c) pollinate flowers (d) destroy flowers
39. Which of the following possesses mammary gland? (a) catfish (b) dogfish (c) shark (d) whale
40. Which of the following organisms is both carnivorous and autotrophic? (a) sundew (b) Tapeworm (c) Rhizopus (d) Loranthus

BIOLOGY SOLUTION

1. **B:** Amoeba, being a unicellular organism, has a large surface area to volume ratio. Thus, diffusion is sufficient as means of transport
2. **A:** The Phloem has four elements: sieve tubes, companion cells, phloem parenchyma and phloem fibres
Xylem, on the other hand, comprises tracheids, vessels, xylem parenchyma and xylem fibres
3. **C:** Both the stomata of leaves and the spiracle of insects function in gaseous exchange
4. **C:** The genetic make-up of an organism is its genotype.
NB: Mutation is a sudden change in the genetic makeup of an organism
5. **D:** Population dynamics is the study of how and why populations change in size and structure over time
NB: The important factors in population dynamics include rates of reproduction, death and migration
6. **B:** Clay soil is the soil with the highest water-retaining capacity, highest capillarity
Sandy soil, on the other hand, has the lowest water-retaining capacity, lowest capillarity and it is the least water-logged
7. **D:** Poikilothermic animals are those animals whose body temperature varies with that of their external environment. Fishes, amphibians and reptiles are poikilothermic. Those that organisms whose body temperature does not vary with that of the environment are said to be homothermic. Aves and mammals are homothermic. Since lizard is a reptile, it is poikilothermic

8. C: Size, colour and weight are morphological variations while the ability to taste PTC is a physiological variation

9. D: The process by which complex substances are broken down into simpler ones is known as **catabolism**. Anabolism, on the other hand, is a process by which simple substances are joined to form complex ones

10. C: *Taenia Solium* is found in pork (pigment) while *Taenia saginata* is found in beef (cow meat)

NB: *Taenia solium* has hooks while *Taenia saginata* does not.

11. A:

- Mesophytes are those plants that grow in areas with moderate supply of water
- Xerophytes are those that grow in areas with limited supply of water
- Hydrophytes are those that grow in water

12. B: This is known as translocation

NB: Phloem conducts / transports manufactured food while xylem transports water and mineral salts

13. B: Note that aorta is also an artery. Likewise, Vena cavae is also veins

14. D: The blood plasma constitutes about 55% of the volume of blood while blood corpuscles constitute about 45%

Blood corpuscles \equiv Blood cells

(Erythrocytes, Leucocytes & Thrombocytes)

15. D: The transfer of pollen grains from the mature anther to a receptive stigma is known as **pollination**

16. A: Gonorrhoea is caused by *Neisseria gonorrhoea*

- Syphilis is caused *Treponema Pallidum*
- Tuberculosis is caused by *Mycobacterium tubercle*
- Leprosy is caused by *Mycobacterium leprae*

17. D: The clumping together of red blood cells is known as agglutination

18. C: Since the rate of transpiration depends on the surface area of the leaves, the reduction of leaves to spines is one of the ways *Cactus opuntia* conserves water

19. B: O \Rightarrow Universal donor

AB \Rightarrow Universal recipient

20. D: The taxon that contains organisms with the **highest similarities** is the **species** while that containing the most diverse group of organisms is the **kingdom**

21. C:

- The opening of the stomata of the epidermis in plants is by the process of osmosis.
- The guard cells control the opening and closing of the stomata
- The guard cells are the only epidermal cells with chloroplast

22. A: An adult amphibian uses the skin, lungs and mouth for gaseous exchange

Through skin \Rightarrow Cutaneous respiration

Through lungs \Rightarrow Pulmonary respiration

Through mouth \Rightarrow Buccal respiration

23. B: The Bowman's capsule is the part of the nephron associated with ultra filtration,

NB: Malpighian body/ capsule / corpuscle =

Glomerulus + Bowman's capsule

24. A: Glucose is a simple carbohydrate while glycogen, starch and cellulose are complex carbohydrates

25. D: *Ascaris lumbricoides* is a parasitic roundworm which causes ascariasis, an infection of the small intestine

26. D: Parasitic flatworms such as tapeworms do not possess an alimentary canal. This is because they absorb already digested food

NB: A tapeworm does not absorb nutrient with its suckers but with its entire body surface. The hooks and suckers are for attachment to the host's intestine

27. B: The relationship between *Rhizobium* and leguminous plants is an example of mutualism. The bacterium helps the leguminous plant in nitrogen fixation while the plant provides food and shelter for the bacterium

28. D:

- Sex-linked characters are located only on X-chromosomes
- They are recessive
- Females only suffer from sex-linked diseases as both X-chromosomes are defective. Thus, a female may be normal, carrier or suffers from a sex-linked disease
- A male is either normal or suffers. This is because a male has only one copy of the X-chromosome

29. C: A tissue is a group of cells that have similar structure and that function together as a unit.

30. C: Pulmonary circulation involves the heart and the lungs while systemic circulation involves the heart and the rest of the body

31. D: Magnesium is one of the key elements needed for the formation of **chlorophyll**. Thus, it is required for the growth of a healthy green plant.

NB: The other elements needed for chlorophyll formation are iron and nitrogen

32. C:

- Plants store carbohydrate as starch
- Animals and fungi store carbohydrate as glycogen

33. B: Bile emulsifies fat. Connect that the enzymes that act on fats and oils (lipids) are called lipases

34. D: Kwashiorkor is a deficiency disease of protein. Since beans is a proteinous food, it is the appropriate food to be given

35. C: The barometer is the instrument for measuring air pressure

Secchi disc \Rightarrow water turbidity

Photometer \Rightarrow Light intensity

Hygrometer \Rightarrow Relative humidity

36. D: The primary cause of species endangerment is disappearing habitats

37. C: Sickle cell anaemia is a heritable disease. It affects the red blood cells. Sickle cell anaemia turns red blood cells from round flexible discs into sticky stiff sickled cells. These sickled cells don't live as long as normal red blood cells

38. C: Bees are of great importance to the farmer because they pollinate flowers

NB: Flowers that are pollinated by insects are called **entomophilous flowers**

39. D: Even though whale is an aquatic animal, it is not a fish. Whale is a mammal

40. A: Insectivorous plants are both carnivorous and autotrophic. They are autotrophic because they manufacture their food (through photosynthesis). They are carnivorous because they trap insects (and other small animals) for their nitrogen supplement.

BIOLOGY

2021 UTME MODEL BIOLOGY QUESTIONS

1. The taxon containing the least similar set of organisms is the (a) species (b) genus (c) order (d) kingdom

2. Which of the following is true about sex-linked characters? (a) they are dominant and linked to X-chromosome (b) They are recessive and linked to X-chromosome (c) They are dominant and linked to Y-chromosome (d) they are recessive and linked to Y-chromosome

3. The smallest bone in the human body is the (a) stapes (b) femur (c) malleus (d) incus

4. The instrument with which atmospheric pressure is measured is the (a) wind vane (b) hydrometer (c) barometer (d) hygrometer

5. Cutaneous respiration is peculiar (a) Pisces (b) amphibians (c) reptiles (d) Aves

6. The content of which of the following is acidic? (a) mouth (b) stomach (c) Duodenum (d) stomach & duodenum

7. Height, skin color, weight and colour of the eyes are examples of (a) morphological variation (b) physiological variation (c) discontinuous variations (d) sex-linked characters

8. When an allele can express itself both in the homozygous pairing and the heterozygous pairing, it is said to be (a) recessive (b) dominant (c) an allelomorph (d) genetic

9. Beriberi is a deficiency symptom of vitamin (a) A (b) K (c) B1 (d) C

10. Which of the following animals has diastema? (a) fish (b) Human (c) Dog (d) rabbit

11. The plant hormone that is responsible for ripening of fruits is (a) auxin (b) gibberellin (c) acetylene (d) ethylene

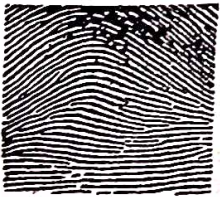
12. Which of the following blood types has no antibody? (a) O (b) A (c) AB (d) O

13. The bacteria that cannot convert atmospheric nitrogen to soil nitrate are called (a) denitrifying bacteria (b) nitrogen-fixing bacteria (c) putrefying bacteria (d) aerobic bacteria

14. In which of the following organisms is diffusion efficient as a mean of gaseous exchange? (a) rat (b) lizard (c) earthworm (d) cockroach

15. The cell organelle that is responsible for respiration is the (a) mitochondrion (b) ribosome (c) lysosome (d) endoplasmic reticulum

16. *Taenia saginata* is associated with (a) fish (b) pork (c) beef (d) dog
17. The genetic make-up of an organism is known as its (a) phenotype (b) blood type (c) genotype (d) allelomorph
18. The seat of intelligence in the brain is the (a) Pons varolli (b) thalamus (c) cerebrum (d) cerebellum
19. The study of how and why population size changes over time is known as (a) population estimation (b) population cycle (c) population ecology (d) population dynamics
20. Which of the following sits comfortably at the borderline between living and non-living things? (a) virus (b) bacteria (c) protozoan (d) alga
21. The pigment utilized by the chameleon for changing colour is (a) pneumatophore (b) carotene (c) melanin (d) chromatophore
22. Which of the following serves as a passage for both urine and semen is the (a) urinary bladder (b) urethra (c) ureter (d) seminal vesicle
23. Which of the following is not a process in urine formation? (a) detoxification (b) ultrafiltration (c) hormonal secretion (d) selective re-absorption
24. The water cycle is maintained mainly by (a) evaporation (b) condensation (c) evaporation and condensation (d) transpiration and respiration
25. Which of the following involves only one living organism? (a) predation (b) commensalism (c) saprophytism (d) mutualism
26. The competition between paramecium *Aurelia* and paramecium *caudatum* is (a) interspecific (b) intraspecific (c) intergeneric (d) intrageneric
27. The theory of use and disuse was propounded by (a) Jean Lamarck (b) Gregor Mendel (c) Charles Darwin
28. The number of chromosomes in the cheek cell and the sperm cell of a human are respectively (a) 50 & 25 (b) 46 & 23 (c) 23 & 46 (d) 92 & 46
29. The bright coloured eye spots on the hind wings of a moth are an example of (a) mimicry (b) cryptic colouration (c) disruptive colouration (d) warning colouration
30. Given that both parents are heterozygous for a particular trait the probability that an offspring will be recessive for that trait is (a) $\frac{1}{2}$ (b) $\frac{3}{4}$ (c) $\frac{1}{4}$ (d) 1
31. Which of the following is not part of the axial skeleton? (a) Ulna (b) skull (c) sternum (d) rib
32. The feature that makes locomotion in water easy for fish is the (a) lateral line (b) streamlined body (c) slimy body (d) scaly body
- Use the diagram below to answer questions 33-35



33. The fingerprint shown above is (a) loop (b) whorl (c) arch (d) compound
34. The diagram shows what type of variation? (a) morphological (b) physiological (c) both (d) neither
35. The structure is effective for (a) resolving paternity dispute (b) detection (c) ancestral tracing (d) B and C

36. The only blood vessel that begins and ends in capillaries is (a) aorta (b) hepatic artery (c) hepatic portal vein (d) renal vein
37. Which of the following is not a digestive enzyme? (a) erepsin (b) lipase (c) trypsin (d) bile
38. The vertebrate group that shows the most parental care to their offspring is (a) amphibian (b) mammalia (c) aves (d) reptilia
39. The hardest material in the human body is (a) enamel (b) pulp cavity (c) bone (d) dentine
40. Which of the following bears naked seeds? (a) mango (b) moss (c) cycad (d) fern

SOLUTION

1. **D:** The kingdom is the taxon in which other taxa are embedded i.e it is the largest taxon and as such contains the most dissimilar set of organisms. Species is the smallest taxon and as such tends to comprise organisms that are closely related.
2. **B:** Sex-linked characters are recessive and are linked to X-chromosome
3. **A:** The smallest bones in the human body are the ear ossicles - malleus (hammer), incus (anvil) and stapes (stirrup). Of these ear ossicles, the smallest one is the stapes
4. **C:** - Windvane is used to measure the direction of wind
- Hydrometer is used to measure relative density
- Barometer is used to measure atmospheric pressure
- Hygrometer is used to measure relative humidity
5. **B:** Amphibians exhibit pulmonary respiration, buccal respiration and cutaneous respiration
6. **B:** - The saliva is alkaline
- The alkalinity imposed on food substances by the saliva is neutralized in the stomach by HCl. Thus, the content of the stomach is acidic due to HCl
- The content released into the duodenum is alkaline and this is due to the presence of bile
7. **A:** - Since height, skin colour and eye colour deal with physical appearance, they represent morphological variation
- As these features have many intermediates, they are continuous variations
8. **B:** - An allele that can express itself only in a homozygous pairing is **recessive**
- An allele that can express itself both in the homozygous pairing and the heterozygous pairing is **dominant**.
9. **C:** Vitamin A \Rightarrow Night Blindness
Vitamin K \Rightarrow Haemophilia
Vitamin B1 \Rightarrow Beriberi
Vitamin C \Rightarrow Scurry
10. **D:** Diastema is a feature seen in the jaw of a herbivore. It is a gap between incisors and premolars. The reason for the gap is the lack of canines - herbivores do not have canines
11. **D:** Ethylene (or ethene) is the plant substance that is responsible for ripening of fruits. Ethylene should not be confused with acetylene, ethylene is ethene while acetylene is ethyne
12. **C:** - 'A' has antigen A and antibody B
'B' has antigen B and antibody A
'AB' has antigens A & B but no antibody
'O' has no antigen but has antibodies A & B
13. **B:** Nitrogen fixing bacteria are the bacteria that aid nitrogen fixation i.e the conversion of atmospheric nitrogen to soil nitrate. These bacteria dwell in the root nodules of leguminous plants. The relationship between these bacteria and leguminous

plants is a mutualistic one. While they help the plants in nitrogen fixation, the plants return the favour by providing food and shelter for them.

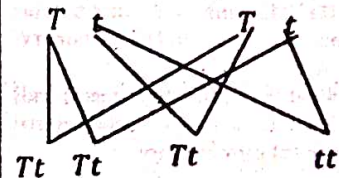
14. **C:** Diffusion is an effective means of gaseous exchange in earthworms but not in organisms like lizard and rat due to their large body mass
15. **A:** Mitochondrion is the organelle responsible for respiration. This is why it is known as the power house of the cell
16. **C:** - *Taenia solium* is associated with pork
- *Taenia saginata* is associated with beef
17. **C:** - The genetic make-up of an organism is its **genotype**
- The physical appearance of an organism is its **phenotype**

NB: The phenotype of an organism is determined by its genotype (or we simply say gene) and its environment

18. **C:** The seat of intelligence, consciousness, memory, alertness and judgement is the cerebrum. The cerebellum on the other hand is associated with the maintenance of balance
19. **D:** The study of how and why population size changes over time is known as population dynamics
20. **A:** The virus is at the borderline between living things and non-livings. It behaves as living when in a living system but assumes a crystalline non-living form once it is outside a living system
21. **D:** - The pigment utilized by the chameleon for changing colour is the chromatophore
- Pneumatophore (breathing root) is used by plants in the mangrove swamp for gaseous exchange.

22. **B:** The urethra is urinogenital in role
23. **A:** - The processes involved in urine formation
- Detoxification is the breaking down of harmful substances and it occurs in the liver
24. **C:** Evaporation removes water from the crust while condensation returns it
25. **C:** Each of predation, commensalism and mutualism involves two living organisms while saprophytism involves only one living organism. Saprophytism is between a living organism and a dead and decaying organic matter
26. **A:** Since *P.aurelia* and *P.caudatum* are two different species of paramecium, the competition between them is interspecific.
27. **B:** Jean Baptiste Lamarck propounded the theory of use and disuse while Charles Darwin propounded the theory of natural selection
28. **B:** For a human being, a somatic cell (such as the cheek cell) has 46 chromosomes while a sex cell (such as the sperm cell) has 23 chromosomes. Generally speaking, a somatic cell has twice the number of chromosomes present in a sex cell.

29. **D:** Those bright coloured eye spots on the hind wings of a moth are to scarce off potential predators
30. **C:** The probability that an offspring will be recessive for that trait is $\frac{1}{4}$. Let us consider human height for an illustrations if the two parents are heterozygous for height, we will have:



As can be seen, only one of offspring (tt) will be short

31. A: - Appendicular skeleton consists of the limbs (fore and hind limbs) and the limb girdles (Pelvic and Pectoral)

- Axial skeleton comprises the skull, the vertebral column, the sternum and the ribs

- Since ulna is a bone in the forearm, it is part of the appendicular skeleton

32. B: Locomotion of fish in water is made easy by its streamlined body

NB: The function of the lateral line is to detect vibration in water

33. C: This is arch fingerprint. Arch fingerprints have ridges that form a hill.

NB: i. Loops are the most common type of fingerprints. They constitute about 65% of the encountered fingerprints

ii. Arches are the least common, they constitute about 5% of all fingerprints.

34. A: Fingerprints show morphological variation

35. B: Since no two persons can have exactly the same fingerprint, fingerprints can be used in crime detection.

36. C: The hepatic portal vein is the only blood vessel that begins and ends in capillaries. It transports blood containing digested food substances from the gut to the liver

37. D: Bile is not a digestive enzyme. Emulsification of fats should not be mistaken for digestion

38. B: Mammals show the most parental care followed by birds

39. A: Enamel is the hardest material in the human body. It is the outermost part of the teeth

40. C: Cycad is a conifer. Conifers bear naked seeds. Mango is a flowering plant i.e the seeds are not naked while fern and moss are seedless

BIOLOGY

2020 UTME MODEL BIOLOGY QUESTIONS

1. Which of the following types of skeleton does a cockroach possess? (a) Bony skeleton (b) Endoskeleton (c) Cartilaginous skeleton (d) Exoskeleton

2. Hypermetropia is same as _____ and is corrected with the use of _____ (a) Short sightedness, Convex lens (b) Short sightedness, concave lens (c) Long sightedness, convex lens (d) long sightedness, concave lens

3. Which of the following is not an autotroph? (a) mushroom (b) Chlamydomonas (c) Zea mays (d) Mangifera indica

4. A leaf of a particular plant was plucked. Upon examination, the veins on the leaf are found to be parallel to one another. Which of the following is likely to be the plant? (a) Bean (b) maize (c) soy bean (d) groundnut

5. Which of the following does not have three pairs of legs? (a) cockroach (b) housefly (c) cricket (d) spider

6. The sex (gender) of a baby is determined during _____ (a) copulation (b) ovulation (c) fertilization (d) gestation

7. The following are parts of a feather except (a) barbules (b) wing (c) cane (d) after shaft

8. Which of the following is a water soluble vitamin? (a) vitamin A (b) vitamin D (c) vitamin C (d) vitamin K

9. The only blood vessel that begins and ends with a capillary is the (a) aorta (b) hepatic portal vein (c) jugular vein (d) carotid artery

10. The sechi disc is used in the measurement of (a) turbidity (b) waves (c) tides (d) rain fall

11. Which of the following organelles is common to both plant and animal cells? (a) Chloroplast (b) Cell wall (c) Mitochondria (d) Centrosome

12. The following are excretory products except (a) faces (b) sweat (c) CO₂ (d) urine

13. Bacteria which free soil nitrogen are called (a) nitrating bacteria (b) denitrifying bacteria (c) nitrifying bacteria (d) nitrogen-fixing bacteria.

14. Coagulation of milk proteins is done by (a) ptyalin (b) trypsin (c) rennin (d) pepsin

15. The phenotypic ratio of the offspring obtained from a cross between a short plant and a heterozygous tall plant is (a) 1:3 (b) 2:1 (c) 1:1 (d) 3:1

16. Which of the following animals lack canine? (a) Rabbit (b) Lion (c) Man (d) Dog

17. In which of the following does the conversion of excess amino acids into urea occur (a) Liver (b) Kidney (c) Pancreas (d) Villi

18. The following are tests for protein except (a) Biuret test (b) Osmic acid test (c) Millon's test (d) Xanthoproteic test.

19. Which of the following groups contains diseases caused by bacteria? (a) Syphilis, gonorrhoea (b) Tuberculosis, polio (c) Tuberculosis, small pox (d) Measles, gonorrhoea

20. The character shown by an organism is due to the effects of (a) hormones and chromosomes (b) hormones and genes (c) chromosomes (d) genes and environment

21. The power of accommodation of the human eye is controlled by the (a) ciliary muscles (b) cornea (c) lens (d) aqueous humor

22. A person whose blood can be donated to all other people must have the blood type (a) O (b) AB (c) A (d) B

23. Which of the following is/are the product(s) of sucrose hydrolysis? (a) Glucose (b) Glucose and gelatos (c) Glucose and fructose (d) Mannose.

24. In what part of a leguminous plant can a bacterium like Rhizobium leguminosarium be found? (a) Root nodules (b) spongy mesophyll of leaf (c) palisade mesophyll of leaf (d) Internodes

25. If a plant can grow in the desert, it is called a/an _____ (a) mesophyte (b) epiphyte (c) xerophytes (d) hydrophyte

26. Which of the following is incorrect? (a) Blood in the pulmonary artery is richer in oxygen than that in the pulmonary vein (b) Arteries are thicker and larger than veins (c) The hepatic portal vein is the richest when it comes to food substances (d) None of the above

27. The following are non-seed producing except (a) mosses (b) whistling pine (c) algae (d) liverwort.

28. A plant whose leaves are yellow is likely to be deficient in (a) iron (b) boron (c) potassium (d) zinc

29. The aperture between the left auricle and the left ventricle is guarded by the (a) bicuspid valve (b) tricuspid valve (c) ventricular valve (d) parastim

30. Which of the following relationships involves only one organism? (a) Saprophytism (b) predation (c) commensalism (d) parasitism

31. During cell division, the two strands of chromosomes are joined at a point known as the (a) aster (b) centromere (c) spindle (d) chromatid

32. Muscles are attached to bones by means of (a) tendons (b) ligaments (c) sutures (d) filaments

33. In which of the following organisms would glycogen be stored?

34. What would happen to a man whose pancreas has been surgically removed? (a) The level of blood sugar would increase (b) The glycogen content of the liver would increase (c) His blood pressure would decrease (d) His weight would increase drastically

35. Carbon monoxide poisons tissues by (a) combining with hemoglobin (b) destroying blood vessels (c) killing the cells (d) turning the blood black

36. The following are continuous variations except (a) height (b) weight (c) skin colour (d) tongue rolling

37. Warm-blooded animals are said to be (a) homeothermic (b) poikilothermic (c) polythermic (d) homeostatic

38. The oxygen released during photosynthesis is from (a) CO₂ (b) enzymes (c) hydrogen ions (d) water

39. The appendicular skeleton comprises (a) limbs and skull (b) pectoral girdle and spinal cord (c) limbs and limb girdles (d) sternum, vertebral column, ribs and skull

40. Insects visit flowers in order to (a) pollinate the flowers (b) deposit pollen on the stigma (c) feed on the nectar (d) pluck away some anthers.

2020 UTME MODEL BIOLOGY SOLUTION

1. D: • Exoskeleton is the type of skeleton which is

found on the external part of the body of some animals. Organisms with exoskeleton include insects, snails, prawns, crabs, spiders, crayfish etc.

• Endoskeleton is the type of skeleton which is found inside the body of the animals such as mammals, fishes, toad, lizards and birds

• Hydrostatic skeleton is the type of skeleton whereby support is provided by fluid pressure. Anemones and earthworms are examples of organisms that possess hydrostatic skeleton.

2. C: • Myopia is same as short-sightedness and is

corrected with the use of concave or diverging lens.

• Hypermetropia is same as long-sightedness and is corrected with the use of convex or converging lens

3. A: Chlamydomonas, Zea mays & Mangifera

indica are green plants. They are thus autotrophs since they can manufacture their own food.

Mushroom is a fungus. It cannot manufacture its own food since it does not possess chlorophyll. It is therefore not an autotroph; it is a heterotroph

4. B: Maize is a monocotyledonous plant while others are dicotyledonous plants. Note that

while dicot plants possess net venation, monocot plants possess parallel venation.

5. D: Spider (an arachnid) has four pairs of legs while insects (cockroach, housefly, cricket etc) have three pairs of legs.

6. C: The gender of a baby is determined during fertilization. If the sperm that fertilizes the

egg is of X-chromosome the baby will be female and if Y-chromosome, the baby will be male.

7. B: Barbule, vane and aftershaft are parts of a feather while a wing contains many feathers.

8. C: • Vitamins A, D, E and K are fat-soluble vitamins.

• Vitamins B and C are water-soluble vitamins

9. B: The hepatic portal vein is the only blood vessel that begins and ends with a capillary.

10. A:

Ecological factor	Instrument
Rainfall	Rain gauge
Water turbidity	Secchi disc
Wind (direction)	Wine vane
Wind (speed)	Anemometer
Temperature	Thermometer
Light intensity	Photometer
Light intensity in water	Hydro photometer
Air pressure	Barometer

11. C: • The organelles common to both plant animal cells are nucleus mitochondria, cytoplasm, cell membrane, lysosome, ribosome, endoplasmic reticulum, Golgi bodies etc.

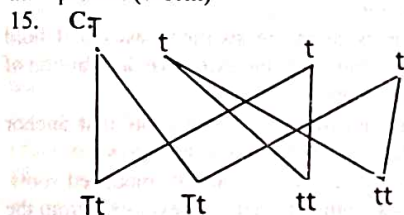
- Plant cells have no centrioles and centrosomes
- Animal cells have no chloroplast and cell wall.
- Vacuoles, if present in a given animal cell, are always very small while plant cells have large vacuoles

12. A: Faeces is not an excretory product, it is an undigested food substance. Instead, it can be called an egestory product.

13. B: Bacteria which free soil nitrogen are called denitrifying bacteria. They convert the nitrogen in the soil to atmospheric nitrogen.

A. good example in pseudomonas.

14. C: Coagulation/curdling of milk proteins is done by rennin. It does this by converting the soluble milk protein (caseinogens) to the insoluble milk protein (casein)



2 tall: 2 short = 1:1

16. A: Canine is primarily used for tearing flesh. Since herbivores do not feed on flesh, they have no use for canine and therefore lack it

- Rabbit is a herbivore
- Lion and Dog are carnivores
- Man is an omnivore.

17. A: Excess amino acid is converted to urea through the process of deamination, which occurs in the liver. This should not be confused for urine formation which occurs in the kidney.

18. B: Osmic acid test is a test for fats and oils while Biuret test, Millon's test and Xanthoproteic test are for protein.

19. A: • Syphilis, gonorrhoea and tuberculosis are caused by bacteria.

- Small pox, measles and poliomyelitis are caused by viruses.

20. D: The character displayed by an organism is interplay of the gene and the environment.

21. A: Accommodation is the ability of the eye to see near and distant objects clearly. It is controlled by the ciliary muscles.

22. A: If a person's blood can be given to all other people, the person must have blood type O. O is the universal donor while AB is the universal recipient.

23. A: • The hydrolysis of sucrose yields glucose and fructose.

- The hydrolysis of maltose yields glucose (1 unit of maltose yields 2 units of glucose)

The hydrolysis of lactose yields glucose and galactose.

24. A: Rhizogium leguminosarium is a symbiotic nitrogen-fixing bacterium. It inhabits the root nodules of leguminous plants where it gets food and shelter and in turn help the plant in nitrogen fixation

25. C: • Mesophytes are plants that grow in regions with moderate supply of water.

- Hydrophytes are those that grow in fresh water.

- Xerophytes grow in regions with limited supply of water.

- Halophytes grow in salty water.

- Epiphytes are plants that grow on other plants, without causing any harm to the host plant.

26. A: The pulmonary artery transports deoxygenated blood from the heart to the lungs (for oxygenation) while the pulmonary vein returns the oxygenated blood to the heart.

Thus, it is the blood in the pulmonary vein that is richer in oxygen than that in the pulmonary artery and not the other way round.

27. B: Schizothymes, thallophytes (e.g algae) bryophytes (mosses & liver worts) and pteridophytes (e.g ferns) are non-seed producing plants.

Spermatophytes (angiosperms and gymnosperms) are seed-producing plants. Note that whistling pine is an example of gymnosperms.

28. A: The elements required for chlorophyll formation are magnesium, iron and nitrogen. Thus, yellowing of leaves (chlorosis) is a symptom of the deficiency of any of those elements.

29. A: The aperture between the left auricle and the left ventricle is guarded by the bicuspid valve while that between the right auricle and the right ventricle is guarded by the tricuspid valve.

30. A: Saprophytism involves only one organism since a saprophyte obtains its nutrient from the remains of plants and animal.

31. B: The two strands of chromosomes (the sister chromatids) are joined at a point known as the centromere.

32. A: Muscles are attached to bones by means of tendons while bones are held to bones (at joints) by ligaments.

33. A: Plants store carbohydrate as starch while animals and fungi store carbohydrate as glycogen.

34. A: The hormones required for blood sugar regulation (insulin and glucagon) are produced in the pancreas.

35. A: Carbon monoxide poisons tissues by combining with hemoglobin. The effect of this is that less hemoglobin will be available for oxygen transportation. This may lead to suffocation and eventual death.

36. D: Height, weight and skin colour are examples of continuous variation while the ability to roll the tongue is a discontinuous variation.

37. A: Warm-blooded animals (e.g mammals) are called homeothermic animals while cold-blooded animals are called poikilothermic animals

38. D: The oxygen released during photosynthesis has been demonstrated to come from water.



39. C: The appendicular skeleton comprises the limbs (for limb and hind limb) and limb girdles (pelvic girdle and pectoral girdle).

40. C: Although some flowers are pollinated by insects (entomophilous flowers), the intent of these insects is not to pollinate the flowers. The insects visit these flowers to feed on their nectar but also end up pollinating the flower during this process

BIOLOGY 2019 UTME MODEL BIOLOGY QUESTIONS

1. Benedict's solution is used to test for (a) carbohydrate (b) lipid (c) protein (d) vitamins

2. A group of populations that interact in a given habitat can be described as (a) environment (b) biosphere (c) biome (d) community

3. At times, hyenas feed on remains of animals killed by other animals. At other times, hyenas themselves kill animals for food. Therefore, hyenas may best be described as (a) herbivores and parasites (b) scavengers and predators (c) herbivores and predators (d) scavengers and herbivores

4. Which of the animals below is poikilothermic? (a) toad (b) dove (c) lion (d) chicken

5. The process which ensures that the chromosome number for each species of organisms remains constantly from generation to generation is called (a) oogenesis (b) fusion (c) mitosis (d) meiosis

6. Which of the following is not part of the whorls of a flower? (a) Calyx (b) Corolla (c) Androecium (d) Antheridium

7. In man, the thoracic region of the vertebral column is made up of how many vertebrae? (a) 7 (b) 5 (c) 12 (d) 4

8. Plants which can survive in places where water supply is limited are called (a) bryophytes (b) mesophytes (c) xerophytes (d) hydrophytes

9. Which of the following has a four-chambered heart? (a) fish (b) insect (c) snail (d) rat

10. Which of the following enzymes curdles milk? (a) Pepsin (b) Ptyalin (c) Renin (d) Amylase

11. All of the following are modified roots except (a) prop root (b) buttress root (c) climbing root (d) tap root

12. Which of the following is a poly-saccharide? (a) glucose (b) fructose (c) galactose (d) cellulose

13. The end of each molecule of phospholipids that is soluble in water is said to be (a) hydrophilic (b) hydrophobic (c) thigmophilic (d) thigmotropic.

14. The type of association in which both organisms cannot live without the other is called (a) parasitism (b) mutualism (c) commensalism (d) predation

15. Which of the following can be used in place of baking powder? (a) *Saccharomyces cerevisiae* (b) *Rhizopus nigricans* (c) *Allium sativum* (d) *Chlamydomonas rivalis*

16. Which of the following is not a direct consequence of the green house effect? (a) global warming (b) water pollution (c) melting of ice caps (d) increase in land temperature

17. Which of the following parts of the leaf possesses air spaces? (a) upper epidermis (b) lower epidermis (c) palisade mesophyll (d) spongy mesophyll

18. Which of the following organisms possesses the homodont dentition? (a) lizard (b) rat (c) cat (d) man

19. Which of the following arthropods lacks antennae? (a) millipede (b) prawn (c) spider (d) cockroach

20. If a red blood cell is placed in hypertonic solution for a while, the cell will become (a) plasmolyzed (b) crenated (c) haemolysed (d) unaffected
21. Which of the following glands secretes a substance into the bloodstream? (a) gastric gland (b) salivary gland (c) fear gland (d) adrenal gland
22. During blood transfusion, agglutination may occur as a result of the reaction between (a) similar antigens and antibodies (b) contrasting antigens and antibodies (c) two different antigens (d) two different antibodies
23. Which of the following substances from the mother's blood diffuse through the placenta into the blood of the foetus? (a) glucose and oxygen (b) urea and carbondioxide (c) urea and oxygen (d) carbondioxide and oxygen
24. If the cerebellum of a person is slightly damaged, which of the following will be impaired? (a) vision (b) walking (c) digestion (d) breathing
25. Which of the following is likely to have a higher concentration of mitochondria? (a) white blood cell (b) egg cell (c) sperm cell (d) red blood cell
26. The liver performs all the following functions except (a) regulation of heat (b) formation of cholesterol (c) removal of red blood cells (d) synthesis of vitamins
27. The type of storage organ found in ginger is called (a) bulb (b) cutting (c) tuber (d) rhizome
28. Pest can be controlled without subsequent danger of polluting the eco-system by (a) spraying the ecosystem with pesticides (b) burning (c) increasing the population of natural enemies of the pest (d) eliminating the natural enemies of the pests.
29. Which of the following represents the Watson - Crick DNA base pair model? (a) G-T (b) T-C (c) T-A (d) G-A
30. Which of the following infections is unlikely to respond to antibiotics treatment? (a) Tetanus (b) Gonorrhoea (c) Typhoid fever (d) Measles
31. Prokaryotic cells are found in (a) monerans (b) algae (c) tracheophytes (d) spirogyra
32. If two parents are sickle cell carriers then their genotypes would be (a) $Hb^A Hb^A$ and $Hb^A Hb^A$ (b) $Hb^S Hb^S$ and $Hb^S Hb^S$ (c) $Hb^A Hb^A$ and $Hb^S Hb^S$ (d) $Hb^A Hb^S$ and $Hb^A Hb^S$
33. The correct order of classification of human being is (a) animalia, chordate, vertebrata, mammalian, primate, hominidae, homo and sapiens (b) animalia, vertebrata, mammalian, chordate, primate, homosapiens and hominidae (c) chordate, animalia, vertebrata, mammalian, primate, hominidae, homo and sapiens (d) animalian, homo and sapiens.
34. The botanical name for yellow yam is (a) *discorea rotundata* (b) *discoren cayenensis* (c) *discorea alata* (d) *discorea bulbiferous*
35. The hormone which tones up the muscles of a person in time of danger is from (a) thyroid gland (b) pancreas (c) adrenal gland (d) sebaceous gland
36. When two opposite genes for the same character are contained in the same individual, the character that shows is known as (a) superior character (b) dominant character (c) recessive character (d) controlling character
37. During anaerobic respiration, the products obtainable are (a) water and carbondioxide (b) ethanol and carbondioxide (c) ethanol and water (d) ethanol only

38. Which of the following bones belong to the appendicular skeleton? (a) ulna (b) skull (c) cervical vertebra (d) sternum
39. The formation of fruit without fertilization is known as (a) oogenesis (b) parthenocarpy (c) parthenogenesis (d) sporulation
40. Which of the following is not a form of placentation? (a) marginal (b) ovulation (c) basal (d) free-central (d) axile

2019 BIOLOGY SOLUTION

1. A:
- Benedict's solution is used to test for the presence of reducing sugars. The formation of an orange-red precipitate indicates the presence of a reducing sugar.
 - Lipids are tested for by using osmic acid
 - Another test for lipids (fats & oils) is the transparency test
 - Biuret test, millon test and xanthoproteic test are all for proteins
2. D:
- A group of populations that interact together in a given habitat constitutes a community.
 - Biosphere encompasses hydrosphere, atmosphere and lithosphere
 - The environment of an organism must not be mistaken for its surrounding. In biology, the environment of an organism refers to everything that affect the organism.
 - Biomes are large natural terrestrial ecosystems
3. B: Scavengers are animals that feed on remains or dead animals. Predators, on the other hand, kill other animals directly for food.
4. A: Homiothermic animals are those animals that have a constant body temperature. Their body temperature does not vary with that of their surrounding. *Mammals* and *aves (birds)* are *homiothermic*. Poikilothermic animals are those whose body temperature varies with that of the surrounding. *Pisces (fishes), amphibians and reptiles* are *poikilothermic*.
- NB: Homiothermic animals are also called warm-blooded animals while poikilothermic animals are also called cold-blooded animals. Thus, Dove & Chicken → Birds → Homiothermic
Lion → Mammal → Homiothermic
Toad → Amphibian → Poikilothermic
5. C:
- Meiosis gives rise to daughter cells with half the number of chromosomes as the parent cell. This is why meiosis is sometimes addressed as *reductional division*.
 - Mitosis ensures that the daughter cells have the same number of chromosomes as the parent cell. This explains why mitosis is sometimes called *equational division*.
 - Both spermatogenesis and oogenesis are meiotic processes.
6. D:
- Anteridium* is not a part of the whorl of a flower, it is the male sex organ of non-flowering plants.
 - The female organ of non-flowering plants is called *archegonium*
7. C: A man has twelve thoracic vertebrae. See the table below:

Types of vertebrae	Man	Rabbit	Rat
Cervical	7	7	7
Thoracic	12	12	13

	5	7	6
Lumbar	5	3-4	4
Sacral	4	16	27-30

8. C:
- Xerophytes are plants that can survive in places with limited supply of water. Examples of xerophytic plants are Cactus, Euphorbia and Aloe
 - Mesophytes are plants that are found in places with adequate water supply. Examples are cassava, mango, maize etc.
 - Hydrophytes are plants that live in fresh water. Examples of hydrophytes are hyacinth, water lily and water lettuce.
9. D:
- Pisces (fishes) have two-chambered hearts → One auricle and one ventricle.
 - Amphibians have three-chambered hearts → Two auricles and one ventricle.
 - Reptiles have hearts with two auricles and a partially divided ventricle.
 - Aves and mammals have four-chambered hearts → Two auricles and two ventricles.
10. C:
- Pepsin converts proteins to peptones
 - Ptyalin partially hydrolyses starch to maltose
 - Renin curdles milk. It does this by converting the soluble caseinogens in milk to insoluble casein.
11. D:
- Prop roots are adventitious roots that develop from branches or a vertical stem and grow downward into the soil to help support the plant in upright position.
 - Buttress roots are swollen bases that hold trees upright and aid in the extensive distribution of the shallow roots.
 - Climbing roots are aerial roots that anchor the plant to the surface on which it grows. These three types of roots are all modified roots. Tap root is a main root that has developed from the radicles.
12. D: A polysaccharide is a polymeric carbohydrate that contains many monosaccharide units covalently bonded to one another by glycosidic linkage. Glucose, galactose and fructose are monosaccharides having a single polyhydroxyalkanol or polyhydroalkanone unit while cellulose is a polymer of glucose in which the glucose units are linked by glycosidic bond.
13. A: Phospholipids are amphipathic molecules in which one end of each molecule is hydrophilic while the other end is hydrophobic. The hydrophilic end has a great affinity for water molecules while the hydrophobic end has very little affinity for water.
14. B:
- In parasitism, one organism benefit while the other suffers harm.
 - In mutualism, both organism benefit from each other and as a result depend on each other for their survival.
 - In commensalism, one organism benefits while the other neither benefits nor suffers any harm.
 - In predation, an organism feed directly on another organism.
15. A: Yeast (*saccharomyces cerevisiae*) can be used in place of baking powder. The ability of yeast to make flours rise is premised on its releases of CO_2 as the organism respire anaerobically.

16. **B:** Greenhouse effect is an increase in the retention of the sun's radiant energy. It is caused by some gases known as the green house gases. Examples of these gases. Examples of these gases are water vapour, carbon dioxide, nitric oxide, methane and chlorofluorocarbons.

17. **D:** The mesophyll which is between the upper epidermis and the lower epidermis is the photosynthetic ground tissue of the leaf. In many plants, the mesophyll is divided into the palisade mesophyll and the spongy mesophyll. The palisade mesophyll which is more tightly packed is the main site of photosynthesis while the spongy mesophyll which is more loosely arranged functions primarily in gaseous diffusion within the leaf.

18. **A:** In heterodont dentition, the teeth are of different shapes, size and function while in homodont dentition the teeth are all similar. Mammals are the only animals which possess heterodont dentition. Since man, cat and rat are mammals, they all possess heterodont dentition. Lizard, which is a reptile possess homodont dentition.

19. **C:** Arachnids (e.g tick, scorpion & spider) are the only arthropods that lack antenna.

20. **B:** When a red blood cell is placed in a hypertonic solution for some time, it loses water and consequently shrinks. This is known as crenation.

21. **D:** Hormones are secreted from one part of the body into the blood stream which transports them to the target organ. These hormones are secreted from *endocrine glands* such as adrenal gland, pituitary glands, thyroid gland and parathyroid gland.

It must be noted that gastric glands, salivary glands and tear glands are not endocrine glands but *exocrine glands*.

22. **B:** Agglutination occurs between contrasting antigens and antibodies. Before a person is transfused with blood from another person, care must be taken that the antigen in the blood of the donor agrees with the antibody in the blood of the recipient. If a person with blood type A is transfused with type B blood, agglutination will occur because type A blood has antibody B which will attack the antigen in blood type B.

23. **A:** The foetus receives its supply of glucose and oxygen from the mother through the placenta. Placenta also removes excretory wastes such as urea and carbon dioxide from the embryo's blood and pass them into the mother's blood for elimination.

24. **B:** The major function of the cerebellum is the maintenance of balance and posture. Slight damage to the cerebellum will cause his walking to be impaired.

25. **C:** The number of mitochondria found in a cell depends on how active the cell is. A very active cell such as sperm cell must contain a large number of mitochondria.

26. **B:**

- The liver regulates body heat
- It breaks down worn-out red blood cells
- It manufactures vitamin A
- It regulates the blood sugar
- It stores iron
- It forms red blood cells in embryos

27. **D:** Rhizomes is a horizontal underground stem capable of producing the shoot and root system of a new plant. Rhizomes are used as storage organs examples of plants with rhizomes are ginger, turmeric and asparagus.

28. **C:** One of the ways of controlling pests without subsequent danger of pollution the ecosystem is to introduce the natural enemy of the pest. If already present, the number of the natural enemy must be increased. This method of pest control is known as the biological method.

29. **C:** Guanine pairs with cytosine (G-C) while thymine pairs with adenine (T-A). It must be noted that thymine is not found in RNA. In place of thymine, we have uracil.

30. **D:** Measles does not respond to antibiotics treatment as the paramyxovirus causing it is not susceptible to antibiotic.

31. **A:** Prokaryotic cells are found in monerans. Bacteria and blue-green algae are examples of monerans.

32. **D:** A sufferer of sickle cell trait has the genotype $Hb^S Hb^S$, a normal person has $Hb^A Hb^A$ while a carrier's genotype will be $Hb^A Hb^S$.

33. **A:** The classification must be done in this order: Kingdom → Phylum → Sub-phylum → Class → Order → Family → Genus → Species

Human beings belong to:

Kingdom - Animalia

Phylum - Chordata

Sub-phylum - Vertebrata

Class - Mammalia

Order - Primate

Family - Hominidae

Genus - Homo

Species - Sapiens

34. **B:** Yellow yam → *Discorea cayenensis*

White yam → *Discorea rotundata*

Water yam → *Discorea alata*

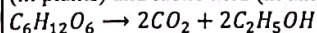
Aerial yam → *Discorea bulbifera*

Chinese yam → *Discorea esculenta*

35. **C:** The hormone which tones up the muscles of a person in time of danger is adrenalin (the emergency hormone). Adrenalin is produced from the adrenal glands that are situated on top of the kidneys

36. **B:** When two opposite genes for the same character are present in the same individual, the trait that is expressed is said to be dominant while the one that fails to be expressed is said to be recessive.

37. **B:** During anaerobic respiration, the products obtainable are carbon dioxide and ethanol (in plants) and lactic acid (in animals).



38. **A:** Axial skeleton comprises the skull, the vertebra column and the sternum while, the appendicular skeleton comprises the bones of the fore limbs (humerus, ulna, radius, carpals, metacarpals and phalanges) and the bones of the hind limb (femur, tibia, fibula etc).

39. **B:** The formation of fruit without fertilization is known as parthenocarpy. In animals, the equivalent is known as parthenogenesis.

40. **B:** Placentation is the arrangement of ovules in the ovary. The types of placentation that are common are marginal, parietal, free-central, axile and basal placentation.

Marginal: Ovules are attached along the edges of the ovary e.g. cowpea.

Parietal: Ovules are located at the margins of the syncarpous ovaries with a single chamber e.g. papaw.

Free-central: Placenta arising as a central up-growth from the base of the ovary e.g. primrose.

Axile: The carpel of a syncarpous ovary is pushed in so that the walls meet in the middle of the ovary and the ovules are borne on the central axis so formed e.g. tomato.

Basal: Ovules are formed at the centre of the ovary e.g. sunflower.

2018 MODEL BIOLOGY QUESTIONS COMPUTER BASED TEST (CBT)

1. Which of these factors in the blood is responsible for blood clotting? A. fibrinogen B. heparin C. plasma D. leucocytes

2. Fat soluble vitamins are stored in A. liver B. spleen C. pancreas D. eyes

3. The unit of nervous system is A. neuron B. axon C. dendrite D. myelin sheath

4. Pepsin is the digestive enzyme which breaks A. sucrose into glucose and fructose B. carbohydrates into simple sugars C. protein into peptones D. fats into glycerol

5. Teleost fish breathes with it's A. fins B. gills C. scales D. lateral line

6. _____ consists mainly of water in the blood? A. lymph B. plasma C. serum D. platelets

7. The gaps between two neurons through which impulses pass by chemical means are called A. axons B. ganglia C. synapses D. dendrites

8. Spider belongs to the same class as A. mosquito B. tick C. chiddae D. cockroach

9. Which of the following tubes conveys sperm from the seminal vesicle to the urethra? A. ejaculatory duct B. epididymis C. oviduct D. vas deferens

10. Lampbrush chromosome occurs in A. salivary gland B. lymph glands C. cancer cells D. oocytes

11. Which of the following parts is involved in both the respiratory and digestive systems A. larynx B. nasal cavity C. pharynx D. trachea

12. The ovary of a flower develops and becomes A. seed B. fruit C. stalk D. petal

13. The organisms that help in recycling the materials in the ecosystem are known as A. herbivores B. carnivores C. omnivores D. decomposers

14. Reiter's syndrome is the name given to a form of A. body odour B. stomach disorder C. infectious arthritis D. gout

15. Which of the following parts of a cell is living? A. cell wall B. calcium oxalate C. food vacuole D. mitochondria

16. The site of fertilization in human is A. ovary B. fallopian tube C. vagina D. starch

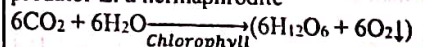
17. In animals, food is stored as A. glucose B. fructose C. glycogen (d) starch

18. *Leishmania donovani* causes A. kala-azar B. elephantiasis C. malaria D. sleeping sickness

19. Which one is not an insect? A. tick B. ant C. beetle D. locust

20. The part of the brain that controls body posture in mammals is A. thalamus B. cerebrum C. spinal cord D. cerebellum

21. A plant which grow on another plant without apparent harm to the host plant is called. A. a parasite B. an epiphyte C. a saprophyte D. a predator E. a hermaphrodite



22. The oxygen given off during the process is derived from A. sunlight B. Chlorophyll C. carbon dioxide D. Atmosphere. E. Water.

23. People suffering from myopia A. can see near object clearly B. can see far away objects clearly C. cannot see any objects clearly D. are colour-blind E. are able to see better in the dark.

24. Which of the following is characteristic of the animal cell? A. Presence of chloroplasts B. Possession of a cellulose cell wall C. Absence of

large vacuoles D. Presence of large vacuoles E. Presence of chromosomes.

25. The hormone which tones up the muscles of a person in time of danger is from the A. thyroid gland B. pancreas C. adrenal gland D. liver E. Spleen.

26. In *Mucor* or *Rhizopus* carbohydrate is absorbed in the form of A. starch B. sucrose C. Glucose D. glycogen E. Arabinose.

27. Milk can be pasteurized by A. the addition of common salt, B. boiling for one hour C. heating to 75°C for 20 minutes D. the addition of vinegar E. heating to 100°C for 12 hours.

28. The organ through which food and oxygen are supplied to the human embryo and which also prevents harmful materials from reaching the embryo is the A. amnion B. uterus C. Placenta D. umbilical cord E. fallopian tube

29. The joint between the atlas and axis vertebrae allows for A. rotatory movements only B. up and down or nodding movements only C. rotatory and nodding movements D. no movement at all E. slight movements

30. Which of the following food substance is digested in the stomach A. Carbohydrates B. Fats and oils C. Fats and proteins D. Proteins E. Carbohydrates and fats.

31. What is the genetic ratio of a cross between a homozygous tall plant and a homozygous dwarf plant? A. Otall :4short B. 3 tall:1 short C. 2 short: 2 tall D. 1 tall: 1 short E. 4tall:0 short

32. The mushroom is an organism which feeds A. parasitically B. saprophytically C. Holozoically D. symbiotically E. Autotrophically.

33. All of the following are digestive enzymes except A. bile B. Lipase C. Maltase D. pepsin E. Ptyalin

34. Which of the following statements is NOT true of symbiosis? A. Symbionts must be living B. It is an association of 'give and take' C. The association may involve two plants D. Association between two similar species E. Symbionts derive mutual benefit.

35. If the anthers of a flower mature before the stigma the condition is termed A. epigyny B. hypogyny C. Protogyny D. protandry E. Perigyny

36. A population is defined as the collection of A. similar organisms that are found in the same habitat B. similar organisms that breed in the same habitat C. similar organisms that interbreed freely in the same habitat D. similar organisms that eat the same food E. different organisms in the same habitat

37. If a 26 year old blind man married a young one-eyed woman and they had four children, how many of them would be blind like their father? A. All B. 3 C. 2 D. 1 E. None

38. External ears of mammals consist of A. pinna and tympanum B. pinna only C. auditory meatus only D. auditory meatus and pinna E. auditory meatus and tympanum.

39. If the gall bladder of a man is removed by surgery, which of the following processes will be most seriously affected? A. Digestion of fats and oils B. Formation of urea C. Digestion of starch D. Conversion Of proteins E. Storage and release of urine

40. Flatworms and roundworms are said to be invertebrates because A. they are small animals B. they can live inside the vertebrates C. some of them are unicellular D. they have no backbones E. they are parasitic

1. A: Fibrinogen is responsible for blood clotting.

2. A: Vitamins A, D, E and K are the fat-soluble vitamins while B and C are water-soluble vitamins. The body does not need the fat-soluble vitamins everyday, unlike water-soluble vitamins that need regular replacement in the body. Fat soluble vitamins are stored by the body for future use. They are stored mainly in the liver and fatty tissues.

3. A: The neuron is the unit of nervous transmission.

4. C: Pepsin breaks protein into peptones, trypsin converts peptones into polypeptide while erepsin converts polypeptide into amino acids.

5. B: A fish breathes with its gills.

6. B: The plasma is the fluid portion of the blood. It is 90% water and 10% dissolved substances.

7. C: The gaps are called synapses or synaptic gap.

8. B: Both tick and spider belong to the class arachnida of phylum arthropoda.

9. D: The vas deferens, also known as the sperm duct, conveys sperm from the seminal vesicle to the urethra. NB: Vas deferens are small tubes which are connected with seminiferous tubules and unite to form epididymis.

10. D: Lampbrush chromosomes are a special form of chromosomes found in the growing oocytes of most animals except mammals.

11. C: The pharynx leads to the gullet (digestive) and larynx (respiratory)

12. B: The ovary of a flower develops and becomes a fruit while the ovule becomes a seed.

13. D: The organisms that help in recycling the materials in the ecosystem are the decomposers. Bacteria and fungi fall under this category

14. C: Reactive arthritis, formerly known as Reiter's syndrome is a form of inflammatory arthritis that develops in response to an infection in another part of the body.

15. D: Some components of a cell are living while others are non-living. Endoplasmic reticulum, ribosomes, golgi body, lysosomes, chloroplast, nucleus and mitochondria are good examples of living cell components while chromoplast, vacuole, cell sap and cell wall are good examples of non-living cell components.

16. B: The site of fertilization in humans is oviduct or fallopian tube.

17. C: Glycogen is the form in which food is stored in animals and fungi while starch is the form in which it is stored in plants.

18. A: *Leishmania donovani* is a species of intracellular parasites belonging to the genus *Leishmania*. It is responsible for visceral leishmaniasis or kala-azar, the most severe form of leishmaniasis.

19. A: Ant, beetle and locust are insects while tick is not. Tick is an arachnid.

20. D: The cerebellum is the part of the brain concerned with the maintenance of balance and posture.

21. B: A plant which grows on another plant without apparent harm to the host plant is called an epiphyte

22. E: The oxygen released during photosynthesis is derived from water: $2H_2O \rightarrow H_2 + OH^-$
 $4OH^- \rightarrow 2H_2 + O_2 + 4e^-$ (O_2 - oxygen released)

23. A: In myopia (short sightedness), the patient can see near objects clearly but distant objects

appear blurred. Reverse is the case for hypermetropia (long sightedness)

24. C: In animal cells, the vacuole is either very small or completely absent.

25. C: The hormone which tones up the muscles of a person in time of danger is adrenalin. Adrenalin is produced from the adrenal gland.

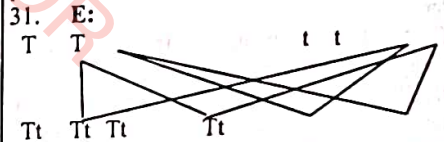
26. D: Carbohydrate is stored as glycogen in animals and fungi. In plants, it is stored as starch.

27. C: Milk can be pasteurized by heating to 75°C for 20 minutes.

28. C: The umbilical cord only connects the embryo to the placenta. The placenta is the organ through which food and oxygen are supplied to the human embryo and which also prevents harmful bacteria from reaching the embryo.

29. C: The joint between the atlas and axis vertebrae allows for rotatory and nodding movements.

30. D: Only proteins are digested in the stomach. Recall that the two enzymes found in the stomach are rennin and pepsin. Renin curdles milk protein while pepsin converts protein to peptones.



All the plants will be tall, albeit heterozygously.

32. B: The mushroom feeds saprophytically. Saprophytic nutrition involves feeding on dead organic matter and digestion occurs extracellularly.

33. A: Lipase, maltase, pepsin, ptyalin etc. are enzymes while bile is not.

34. D: *Symbiosis/mutualism is an association of give and take. *The participants must be living. *It may involve two plants, two animals or a plant and an animal.

35. D: If the anthers of a flower mature before the stigma, the condition is called protandry. If, on the other hand, the stigma matures before the anther, it is called protogyny.

36. C: A population is defined as the collection of organisms of the same species, living together. Recall that species are organisms that can interbreed freely to produce fertile offspring.

37. E: None of the children will be blind since acquired characteristics are not heritable. Only features that are located on genes are heritable.

38. D: The external ears of mammals comprise the auditory meatus and the pinna.

39. A: The gall bladder stores bile which helps in the emulsification of fats. Thus, the removal of gall bladder will affect the digestion of fats and oils.

40. D: Vertebrates are animals that have backbones while invertebrates are those that do not.

2017 UTME MODEL BIOLOGY QUESTIONS

COMPUTER BASED TEST (CBT)

- Size, colour and fingerprints are examples of A. physiological variation B. discontinuous variation C. morphological variation D. adaptive variation.
- The soil component which has the ability to retain a high amount of water is A. loam B. sand C. silt D. clay.
- Ability to taste PTC in some individuals is a character that is A. acquired B. heritable C. sex-linked D. morphological.
- The axial skeleton comprises of A. pectoral and pelvic girdles B. pelvic girdles and the ribs C. fore limb and hind limb D. skull and the vertebral column.

5. An example of organism which exists as a colony is A. Volvox B. Paramecium C. Euglena D. Chlamydomonas.

6. The type of nutrition exhibited by sheep and man is A. saprophytic B. parasitic C. carnivorous D. holozoic.

7. The host of *Taenia Solium* is A. cow B. pig C. sheep D. dog

8. Agglutination can occur during blood transmission when A. similar antigens react B. Blood of incompatible blood groups is mixed C. similar antibodies react D. white blood cells from two persons are mixed.

9. The colour of the left eyes of two out of three newly born kittens of the same parents is different from the right eyes because of A. mutation B. natural selection C. adaptation D. inheritance.

10. The lung of the lungfish is an adaptation for respiration A. to complement gills while in water B. to complement gills while on land C. while on land D. while in water.

11. In mosses the structure which performs the function of water absorption is the A. root hairs B. rhizoids C. capsule D. hyphae.

12. The excretory products common to both plants and animals are A. tannins and salt B. water and urea C. carbon (IV) oxide and resins D. water and carbon (IV) oxide.

13. The allele which phenotypically expresses itself from heterozygous pairing is said to be A. a hybrid B. a mutant C. recessive D. dominant.

14. Carbon (IV) oxide is added to the atmosphere when A. plants build-up organic compounds B. plants absorb mineral salts C. sugars are completely broken down in animals D. there is thunderstorm.

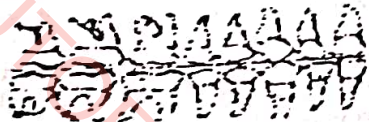
15. The feeding relationship among a set of members of a community is referred to as A. a food web B. pyramid of energy C. a food chain D. pyramid of member.

16. The continuous absence of iron in a diet of man can result to A. anaemia B. goitre C. ricket D. scurvy

17. The matured sex cell which takes part in sexual reproduction is referred to as A. gamete B. foetus C. embryo D. zygote.

18. The joint between the femur and tibia is known as A. hinge joint B. ball-and-socket joint C. pivot joint D. gliding joint.

Use the diagram to answer the question that follows:



19. The dentition is found in A. rat B. dog C. sheep D. man

20. The biome that is characterized with large herbivores, few and scattered fire resistant trees is A. savanna B. tropical rain forest C. montane forest D. desert.

21. The level of organization of Amoeba and Euglena cell is A. organ B. system C. cell D. tissue.

22. An example of insect that undergoes complete metamorphosis is A. tick B. cockroach C. butterfly D. termite

23. Which of the following is an adaptation of grassland vegetation? A. Ability to withstand long periods of drought. B. Possession of fewer tree branches bearing large sized number of leaves C. Ability to maintain a high salt content in their cells. D. Possession of leaves that are large and leathery.

24. Use the diagram to answer the question that follows: The structure is adapted for A. omnivores

B. herbivores C. Carnivores D. omnivores and carnivores.

25. The modification in structure, physiology and behaviour of plant and animal is called A. adaptation B. evolution C. variation D. succession.

26. The protista that is a producer in an aquatic food chain is A. Trypanosome B. Paramecium C. Chlamydomonas D. Amoeba.

27. Use the diagram to answer the question that follows:

The part labelled I is the A. carpel B. sepal C. petal D. stamen



28. The soil type which when present in high proportion will not support the cultivation of vegetable is A. humus B. loam C. silt D. clay.

29. Red blood cells are also known as A. erythrocytes B. thrombocytes C. phagocytes D. leucocytes.

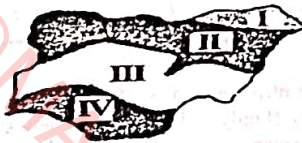
30. Use the diagram to answer the question that follows:

The instrument is used to measure A. atmospheric pressure B. relative humidity C. direction of wind D. spread of wind



31. Use the diagram below to answer the question that follows:

Epiphytic plants are more abundant in the part labeled A. IV B. II C. III D. I



32. Use the diagram to answer the question that follows:



The diagram represents a A. Hygrometer B. Windvane C. Anemometer D. Rain gauge

33. A bacteria that is spherically shaped is called? A. diplobacillus B. occurs C. bacillus D. vibrio.

34. Which of the following is a characteristic of a fungus? A. They all cause disease B. They are both saprophytic and parasitic C. They are all motile D. They reproduce only by sexual method

35. When an ovary is placed on the receptacle above the other floral parts it is referred to as A. half inferior ovary B. superior ovary C. inferior ovary D. half superior ovary

36. Nephridium is a structure that removes waste product from the body of A. an earthworm B. a cockroach C. a turtle D. an ostrich

37. Use the diagram to answer the question that follows:

The part that attracts insect for pollination is A. I B. IV C. II D. III



38. Which of the following factors can reduce the population of a community? A. Immigration. B. Edaphic. C. Predation. D. Mutualism.

39. Use the diagram below to answer the question that follow:



The part labeled is A. tropical rainforest B. Sudan savanna C. Sahel savanna D. Guinea savanna.

40. The most efficient respiratory structure used by free living protozoan is A. body surface B. gills C. buccal cavity D. spiracle.

U.T.M.E BIOLOGY 2017 SOLUTION

1. C: Size, colour and fingerprints are examples of morphological variation since they deal with the body form rather than its functions. Variations that are concerned with how the body functions are said to be physiological e.g. the ability to roll the tongue.

2. D: Clay soil has the highest water retention capacity, followed by loamy soil while sandy soil has the lowest water retention ability.

3. B: The ability to taste Phenyl Thio Carbamide (PTC) is heritable.

4. D: Skull and vertebral column belong to the axial skeleton while limbs and limb girdles make the appendicular skeleton.

5. A: Volvox is a colonial organism, Paramecium, Euglena and Chlamydomonas are not.

6. D: Sheep and man exhibit holozoic nutrition. In holozoic nutrition, organisms feed directly on solid organic matter.

7. B: *Taenia solium* is found in pigs while *Taenia saginata* is found in cows.

8. B: Agglutination can occur during blood transmission when blood samples from incompatible blood groups are mixed. It occurs from the reaction between contrasting antigens and antibodies.

9. A: The difference in the colours of the left and right eyes might be due to genetic mutation.

10. C: The lungfish uses lung for respiration while on land.

11. B: In mosses, the root-like structures are known as rhizoids

12. D: Water and carbon (iv) oxide are common excretory products to plants and animals. Were you thinking plants utilize carbon (iv) oxide and release oxygen as a waste product? This only happens during photosynthesis. During respiration, plants also release carbon (iv) oxide as a waste product alongside water. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

13. D: The allele which expresses itself from heterozygous pairing is said to be dominant while the one that is not expressed is said to be recessive

14. C: The breaking down of sugar to release energy (respiration) adds carbon (iv) oxide to the atmosphere.

15. C: Food chain is a feeding relationship among a set of organisms. The feeding relationship which involves many food chains in known as a food web.

16. A: The persistent absence of iron in a diet of man can result to anaemia.

17. A: A sex cell (lik sperm or ovum) is referred to as a gamete. When gametes unite during fertilization, a zygote is formed.

18. A: The joint between the femur and tibia is a hinge type of joint. The joint between humerus and ulna is another example of hinge joint.

19. D: The diagram shows the set of teeth in one half of the jaws. Since we have 16 teeth there, the teeth in the full jaws must total 32 - dentition of man.

20. A: The savanna is characterized with large herbivores, few and scattered fire resistant trees.

21. C: Amoeba, Chlamydomonas, Euglena, Paramecium etc. exists at the cell level of organization.

22. C: Butterfly undergoes complete metamorphosis while tick, cockroach and termite undergo incomplete metamorphosis.

23. B: The savanna or grassland comprises mainly grasses. Trees, and other woody shrubs are also present. The vegetation is more open with wide spaced trees. The trees have broad leaves.

24. A: As explained on question 19, the dentition is that of a man - an omnivore.

25. A: The modification in structure, physiology and behavior of organisms in order to live successfully is known as adaptation.

26. C: Chlamydomonas is a producer (an autotroph) as it has chlorophyll for photosynthesis.

27. A: The part labeled "I" is the carpel (stigma, style and ovary).

28. D: The soil type which when present in high proportion will not support the cultivation of vegetable is clay.

29. A: Red blood cells → Erythrocytes, White blood cells → Leucocytes, Blood Platelets → Thrombocytes

30. C: The instrument shown above is known as the windvane. It measures the direction of wind. The speed of the wind is measured using an instrument known as the anemometer.

31. A: The southern part of Nigeria is very rich in epiphytes.

32. B: The diagram represents a windvane. A wind vane measures the direction of the wind.

33. B: *Cocci bacteria* are circular in shape, *bacilli bacteria* are rod-like in shape, *vibrio bacteria* are curved in shape, *spirillae bacteria* are spiral and twisted

34. B: Some fungi are saprophytic while others are parasitic

35. B: When an ovary is placed higher than other floral parts, it is said to be a superior ovary. A flower having this type of ovary is described as hypogynous e.g. Hibiscus.

36. A: Nephridium is the excretory structure found in annelids e.g. earthworm.

37. B: The petal is the part of the flower that attracts insects.

38. C: Predation can reduce the population of any community.

39. D: The part labeled III is Guinea savanna.

40. A: The most efficient respiratory structure used by free living protozoans is the body surface. Fishes use gills while amphibians used buccal cavity.

2016 U. T. M. E MODEL BIOLOGY QUESTIONS

1. A group of organisms of the same kind inhabiting the same environments is called A. ecosystem B. habitat C. population D. species
2. Another name for a fertilized egg is a A. placenta B. zygote C. foetus D. ovum
3. The earliest form of life in animal kingdom is the A. Class B. amphibian C. aves pisces D. reptilia

4. An association between bacteria and root nodules of legume is called A. Commensalism B. mutualism C. parasitism D. saprophytism

5. The population of different organisms that exist together in a habitat is called A. biomes B. biosphere C. community D. ecology

6. Which of the following is used to trap flying insects? A. Mosquito net B. Pooter C. Quadrat D. broom

7. The shrinkage of the cell protoplasm away from the cell wall when placed in a hypertonic solution is called A. Flaccidity B. Haemolysis C. Plasmolysis D. Turgidity

8. The largest part of the human brain is the A. forebrain B. midbrain C. hindbrain D. cerebrum

9. The following are examples of oviparous animals except A. crocodile B. dove C. rat D. tilapia

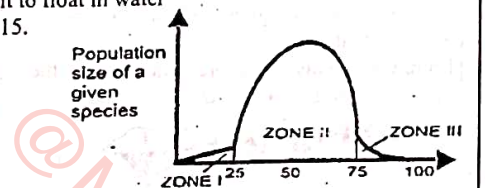
10. Which of the following is a Saprophyte? A. Hydra B. Fern C. Mushroom D. Paramecium

11. One of the following is the unit of life A. Cell B. Tissues C. Organ D. System

12. One of the following diseases is caused by fungi A. Cassava mosaic B. coffee leaf rust C. leaf blight of cassava D. disease of groundnut

13. The most advanced in the following group of plant is A. bryophyte B. Pteridophyta C. Spermatophyte D. thallophytic

14. The main function of the caudal fin in tilapia is to A. Propel it forward in water B. Steer it while changing direction C. Balance it in water D. Enable it to float in water



The zone of physiological stress is represented by A. I and II B. II only C. II and III D. I and III

16. The organelle common to both plant and animal cells is the A. centriole B. plasmalemma C. cell wall D. chloroplast

17. Which of the following is likely to have a higher concentration of mitochondria? A. Sperm cell B. White blood cell C. Egg cell D. Red blood cell

18. The hyphal wall of fungi is rigid owing to the presence of A. cell wall B. lignin C. cellulose D. chitin

19. Angiosperms and gymnosperms belong to the class A. schizophyta B. spermatophyta C. pteridophyta D. bryophyta

20. An example of a radially symmetrical organisms is A. Planaria B. Hydra C. Tapeworm D. roundworm

21. The leech and the earthworm belong to the A. mollusks B. crustaceans C. arachnids D. annelids

22. I. Rattus II. Agama agama III. Bufo regularis IV. Tilapia zilli the order of evolutionary advancement of the above vertebrates is A. I, II, III, IV B. I, IV, III, II C. II, III, IV, I D. IV, III, II, I

23. If a nursing mother is not producing enough milk, her hormonal system is probably deficient in A. testosterone B. thyroxin C. insulin D. prolactin

Use the diagram below to answer questions 24 and 25



The type of joint between adjacent bones in the part labeled II is A. hinge joint B. suture joint C. sliding joint D. ball - and - socket joint

25. The bones labeled II are. Called A. thoracic vertebrae B. lumbar vertebrae C. cervical vertebrae D. sacral vertebrae

26. The breakdown of fats and oils into simpler absorbable compounds is catalyzed by the group of enzymes called A. peptidases B. amylases C. lipases D. hydrolases

27. The two key cations involved in the action potential of nervous transmissions are A. Mg^{2+} and K^+ B. Na^+ and Fe^{2+} C. Fe^{2+} and Mg^{2+} D. Na^+ and K^+

Use the diagram below to answer questions 22 and 23

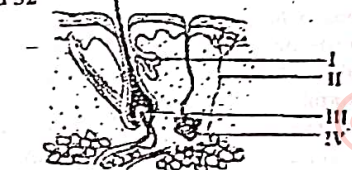


28. The part labeled II is the A. anther B. style C. filament D. stigma

29. The process of pollination involves the transfer of pollens from A. III to IV B. IV to I C. II to III D. I to II

30. The anaerobic fermentation of a glucose molecules yields A. pyruvic acid and alcohol B. 38 ATP molecules C. water and carbon (IV)oxide D. 2ATP molecules and alcohol

Use the diagram below to answer question 31 and 32



31. The function of the part labeled III is to A. produce oil for the skin B. carry blood and nitrogenous waste C. contract to pull the hair erect D. conduct nervous impulses

32. The sweat gland is the structure labeled A. IV B. III C. II D. I

33. The type of reproduction that is common to both Hydra and yeast is A. grafting B. budding C. conjugation D. binary fission

34. Which of the following statements is NOT true of enzymes? They A. are proteins B. need cofactors to activate them C. are sensitive to hydrogen ion concentration D. can withstand high temperature

35. The dorsal and anal fins of fish are used for A. upward movements B. controlling rolling movements D. steering

36. Exoskeleton is NOT found in the A. maggot B. mosquito larva C. earthworm D. caterpillar

37. Blood clotting is initiated by A. leucocytes B. platelets C. haemolymph D. haemoglobin

38. Pepsin is a digestive enzyme which breaks A. cellulose into glucose molecules B. carbohydrates into simple sugars C. protein into peptones D. fats into glycerol and fatty acids

39. Anaerobic respiration in yeast produces A. carbon dioxide and ethanol B. carbon dioxide and water C. carbon dioxide and glucose D. ethanol and water

40. Underground stems which grow horizontally through the soil are A. bulbs B. rhizomes C. runners D. corms

41. A man with a normal haemoglobin (AA) marries a woman who has a sickle - cell haemoglobin (SS). They have a child who has a

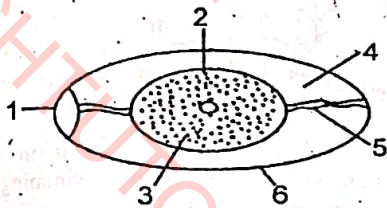
sickle-cell trait. Which of the following genotypes could be associated with the child's haemoglobin A. AA B. OO C. AO D. AS

42. In a Biuret test, some protein was mixed with sodium hydroxide solution. Which of the following chemicals should be added to the mixture for a positive result? A. Mercurious nitrate B. Copper sulphate C. Mercuric nitrate D. Sodium carbonate

43. The removal of a man's pancreas by surgical operation can affect only the digestion of A. starch B. starch, protein and fats C. oils and fats D. carbohydrates and fats

44. The parts used by the tapeworm to fasten itself to the host's intestine are the A. neck and suckers B. hooks and suckers C. rostellum and suckers D. young proglottis and neck

Use Fig 2 to answer questions 45 and 46



45. The young chick is formed from A. 3 B. 3 and 4 C. 1, 3 and 5 D. 2

46. Which part provide food for the developing chick? A. 2 and 3 B. 4 and 5 C. 3 and 4 D. 2 and 5

47. Which of the following types of vertebrae occur in equal numbers in the rabbit, rat and man? A. Caudal B. Thoracic C. Lumbar D. Cervical

48. Which of the following statements is NOT true of the piliferous layer of a root? It A. has a very thin cuticle B. is the outermost layer of the cortex C. may bear root hairs D. its replaced by cork in old root

49. A flowering plant is monoecious if A. the androecium is found on one plant B. the gynoecium is monocarpous essential organs C. it produces essential organs D. the gynoecium and androecium are on the same plant

50. Which of the following is NOT a Waste product of plants? A. Tannins B. Oxygen C. Carbondioxide D. Sap

2016 BIOLOGY SOLUTION

1. C: A group of organisms of the same kind inhabiting the same environment is called **population**. OR WOULD YOU PREFER 'SPECIES'? A species is a group of organisms that can interbreed freely to produce fertile offspring. Spot the difference? Good!

2. B: When egg and sperm unite, the diploid structure produced is known as the **zygote**.

3. B: The evolutionary trend among vertebrates is: Pisces → Amphibians → Reptiles → Aves → Mammals

4. B: The association between nitrogen-fixing bacteria (such as *Rhizobium*) and root nodules of legume is a mutualistic one. The bacteria help in nitrogen fixing while the leguminous plant, in return, provides food and shelter for the bacteria.

5. C: The population of different organisms that exist together in a habitat is called **community**.

6. B: The pooter is an instrument for trapping flying insects.

7. C: Plasmolysis is the shrinkage of the vacuole and pulling away of cytoplasmic linings from the cell wall when a cell is placed in an hypertonic solution.

8. D: The cerebrum is the largest and most dominant part of the brain. It occupies the upper portion in the brain box. It is divided into two

halves: the right cerebral hemisphere and the left cerebral hemisphere.

9. C: Pisces, amphibians, reptiles and aves are oviparous while mammals are viviparous. Thus, a rat is not oviparous as it is a mammal.

10. C: Saprophytes are organisms that feed on dead and decaying organic matters. Fungi like mushrooms are good examples.

11. A: The cells is the basic, structural and functional unit of life.

12. B: Cassava mosaic disease is caused by a virus; groundnut rosette is caused by caused by *Hemileia vastatrix*, a **fungus** of the order pucciniales.

13. C: Spermatophytes (seed plants) are the most advanced plants. The evolutionary trends is Schizophytes → Thallophytes → Bryophytes → Pteridophytes → Spermatophytes.

14. B: The posterior caudal peduncle of a fish carries a fan-shaped unpaired **caudal fin**. The caudal fin is used for steering during swimming.

15. D: As evident from the small population they house, zones I and III are zones of physiological stress.

16. B: The cell membrane (also known as the plasmalemma) is present in both plant and animal cells.

17. A: The more active a cell is, the higher the number of mitochondria it will contain. This is because high activity demands a lot of energy and mitochondria are sites of energy production.

18. D: The hyphal wall of fungi is rigid owing to the presence of chitin.

19. B: Spermatophytes are of two types; some are angiosperms (flowering plants) while others are gymnosperms (cone-producing plants).

20. B: Hydra is radially symmetrical while planaria, tapeworm and roundworm are bilaterally symmetrical.

21. D: The leech and the earthworm belong to the **annelids**.

22. D: The evolutionary trend among vertebrates is: Pisces (e.g. Tilapia) → Amphibians (e.g. Bufo) → Reptiles (e.g. Agama) → Aves → Mammals (e.g. Rattus).

23. D: The hormone that is responsible for the production of milk from the breasts of a nursing mother is **prolactin**.

24. C: The joint between adjacent vertebrae is a **sliding** type of joint.

25. B: The vertebrae labeled "I" are the **cervical vertebrae**; next to them are the **thoracic vertebrae**. The bones labeled "II" are the **lumbar vertebrae**.

26. C: The digestive enzymes that act on fats and oils are known as **lipases**.

27. D: The two key cations involved in the action potential of nervous transmissions are Na^+ and K^+ .

28. A: The part labeled "II" is the anther.

29. C: Pollination involves the transfer of pollen grains from the anther (the part labeled "II") to the stigma (the part labeled "III").

30. D: Anaerobic respiration (fermentation) produces alcohol. Also, only 2 ATP molecules are produced (Instead of 38 ATP produced in aerobic respiration).

31. B: The part labeled "iii" is the blood capillary attached to the hair base.

32. A: The part labeled "iv" is the sweat gland. The sebaceous gland is the part labeled "I".

33. B: Budding is common to both Hydra and Yeast as a mean of reproduction.

34. D: Enzymes cannot withstand high temperature. High temperature destroys enzymes.

35. **No Suitable Option** - The dorsal and anal fins act stabilizers that keep the fish steady while swimming. The anal fin also helps the fish to maintain a straight course.

36. C: **Exoskeleton** is found in maggot, mosquito larva and caterpillar while **hydrostatic skeleton** is found in earthworm.

37. B: The blood platelets (also known as thrombocytes) are responsible for blood clotting.

38. C: **Pepsin converts protein to peptones**; trypsin converts peptones to polypeptides while erepsin converts polypeptides to amino acid.

39. A: Anaerobic respiration in yeast produces carbondioxide and ethanol. $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$

40. B: Underground stems while grow horizontally through the soil are called **rhizomes**.

41. D: AA → Normal haemoglobin; SS → sickle-cell haemoglobin, AS → Carrier of sickle cell trait

42. B: The two reagents employed in Biuret's test for protein are sodium hydroxide (NaOH) are copper sulphate (CuSO_4).

43. B: The pancreatic juice contains amylase (which acts on starch), lipase (which acts on fats and oils) and trypsin (which acts on protein). Thus, the removal of pancreas will affect the digestion of starch, protein and lipids (fats and oils).

44. B: The tapeworm attaches itself to the host intestine by the hooks and suckers.

45. D: The young chick is formed from the germinal disc (the part labeled '2').

46. C: The albumen ('4') and yolk ('3') collectively nourish the developing embryo.

47. D: The cervical vertebrae occur in equal numbers in the rabbit, rat and man (each has seven cervical vertebrae).

48. A: The piliferous layer does not have cuticle.

49. D: A flowering plant is **monoecious** if both the androecium and the gynoecium are located on the same plant. It is **dioecious** if they are located on different plants.

50. D: Tannins, oxygen and carbondioxide are all potential waste products while the plant sap is not.

2015 U.T.M.E MODEL BIOLOGY QUESTIONS

1. Which of the following has the most primitive respiratory systems A. Insect B. Fish C. Snail D. Mouse

2. One adaptation shown by hydrophytes in fresh water habitats is the A. waxy cuticle on shoot surface B. poor development of roots xylem tissues C. well-developed roots and supporting system D. leaves reduced to spines

3. Which of the following uses diffusion as the principal-method of gaseous exchange? A. Grasshopper B. Rat C. Lizard D. Earthworm

4. The theory which supports the view that the large muscles developed by an athlete will be passed on to the offspring was proposed by A. Mendel B. Darwin C. Lamarck D. Pasteur

5. The chromosomes of members of the Kingdom Monera are within the A. nucleoplasm B. nucleus C. nucleolus D. cytoplasm

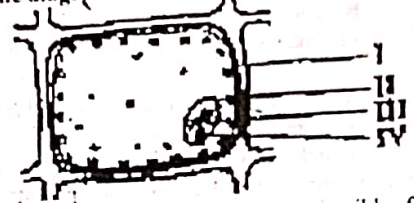
6. The mangrove swamp in Nigeria is restricted to the A. Sahel Savanna B. Guinea Savanna C. Tropical Rainforest D. Sudan Savanna

7. The pancreas secretes enzymes for the digestion of A. fats, proteins and carbohydrates B. fats, vitamins and cellulose C. fats, carbohydrates and vitamins D. proteins, cellulose -and minerals

8. The causative agent of bird flu is A. protozoan B. virus C. bacterium D. fungus
9. A water medium is necessary for fertilization in A. conifers - B. angiosperms C. ferns D. fungi
10. An example of a sex-linked trait is the colour of the skin in humans B. ability to roll the tongue C. possession of facial hair in adult humans D. ability to grow long hair in females
11. In which of the following Nigerian states can montane vegetation be found A. Bauchi B. Plateau C. Taraba D. Enugu
12. Which of the following is true of cloning? A. It is welcomed as an ethically and morally sound science B. It involves the asexual multiplication of the tissues of the original organism C. The clone is similar to but not exactly like the original organism D. Only one cell of the original organism is needed to initiate - the process
13. The process of shedding the exoskeleton of an arthropod is known as A. ecdysis B. instar formation C. metamorphosis D. tagmosis
14. Which of the following is a major cause of constipation in humans? A. Lack of roughage B. Vitamin B C. Vitamin E D. Lack of salts
15. In mammals, the organ directly on top of the kidney is the A. adrenal gland B. prostate gland C. pancreas D. thyroid gland
16. An accurate identification of a rapist can be carried out by conducting a A. RNA analysis B. blood group test C. behavioural traits test D. DNA analysis
17. An example of a fish that aestivates is A. croaker B. lung fish - C. shark D. cat fish
18. The opening and closing of the stoma are regulated by A. respiration B. osmosis C. diffusion D. transpiration
19. Which of the following is common to the mosquito, housefly and black fly? A. Their parasites of man B. Their immature stages are aquatic C. They undergo complete metamorphosis D. Their adults have two pairs of wings
20. The organs that will be most useful to giant African rats in finding their way in underground habitats-are the A. nostrils B. eyes C. vibrissae D. tails
21. A crucible of 5gm weighed 10gm after filling with fresh soil it is then heated in an oven at 1000C for 1 hour. After cooling in a desiccators the weight was 8gm. The percentage of water in the soil is A. 0.8 B. 0.2 C. 0.4 D. 0.6
22. The waste product of hide to leather is A. alkaloid B. resin C. tannin D. gum
23. The correct sequence of the movement of urea during urine formation is A. glomerulus → Bowman's capsule → convoluted tubule → Henle's loop → collecting tubule's B. convoluted tubule → glomerulus → Henle's loop → Bowman's capsule → collecting tubule's C. glomerulus → Bowman's capsule → convoluted tubule → Henle's loop → collecting tubule's D. convoluted tubule → Bowman's capsule → Henle's loop → glomerulus → collecting tubules
24. In lizards, the lowering of the gular fold is used to A. defend their territory B. attract mates C. frighten enemies D. catch insects
25. The photosynthesis pigments include A. chloroplast arid cytochromes B. melanin and haemoglobin C. chlorophyll and carotenoids D. carotenoids and haemoglobin
26. The highest level of ecological organization is the A. ecosystem - B. niche C. biosphere D. population

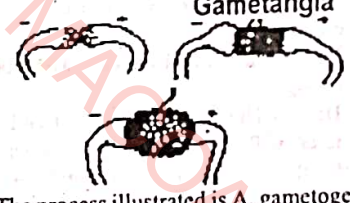
27. A biotic factor which affects the distribution and abundance of organism in a terrestrial habitats is A. pH B. competition C. temperature D. light
28. The eye defect that arises because the cornea is not curved smoothly is A. astigmatism B. short sightedness C. long sightedness D. presbyopia
29. Which of the following is an -example of parasitism? A. A squirrel living in an abandoned nest of a bird B. Mistletoe growing on an orange tree C. Fungi growing on a dead tree branch D. Cattle egrets taking ticks from the body of cattle
30. The increasing order of the particle size in the following soil types is A. silt → sand → clay → gravel B. clay → silt → sand → gravel C. silt → clay → sand → gravel D. clay → sand → silt → gravel
31. Which of the following factors can bring about competition in a population? A. Emigration - B. Drought C. Mortality D. Dispersion
32. Stunted-growth and poor root development are a result of a deficiency in A. phosphorus B. calcium C. sulphur D. iron

Use the diagram below to answer questions 33 to 34



33. The cell organelle solely responsible for respiration is the A. nucleus B. nucleolus C. endoplasmic reticulum D. mitochondrion
34. The organelle responsible for heredity is A. IV B. I C. II D. III

Use the diagram below to answer questions 35 to 36



35. The process illustrated is A. gametogenesis B. sexual reproduction in C. sexual reproduction in spirogyra D. septulation
36. The structure labeled I is the A. zygospore B. conidiospore C. sporangium D. hypha

Use the diagram below to answer questions 37 to 38



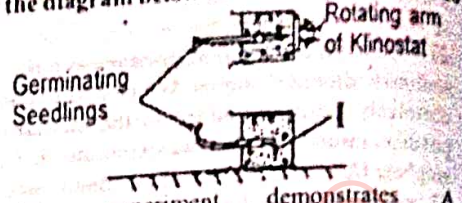
37. The organelle responsible for sexual reproduction is A. IV B. I C. II D.
38. The part labeled IV is responsible for A. respiration B. ingestion C. locomotion D. locomotion

Use the diagram below to answer questions 39 to 40



39. The part labeled I is the A. pulmonary artery B. bicuspid valve C. aorta D. vena cava
40. Oxygenated blood is pumped to the entire body from the part labeled A. IV B. I C. II D. III

Use the diagram below to answer questions 41 to 42



41. The experiment demonstrates A. hydrotropism B. phototropism C. thigmotropism D. hydrotopism
42. The part marked I will contain a high concentration of A. ethylene B. abscisic acid C. auxin D. ascorbic acid

Use the diagram below to answer questions 43 to 44



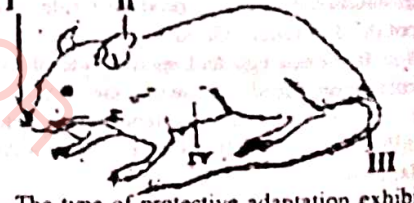
43. The breeding posture illustrated in the diagram is known as A. reproductive swimming B. amplexus C. mating D. courtship
44. The diagram shows that the organisms are A. viviparous B. hermaphrodite C. ovoviviparous D. oviparous
45. Insulin is produced by the endocrine organ labeled A. I B. IV C. III D. II

Use the diagram below to answer questions 46 to 47



46. Which of the following will be true of dog II which lost its tail in an accident if it mates with dog III? A. All its offspring will be born without tails B. 1/2 of its offspring's will be born without tails C. None of its offspring will be born without a tail D. 1/4 of its offspring will be born without tails
47. If the dogs are offspring of a monohybrid cross and the gene G for grey head is dominant over its allele g, the individual whose genotype is likely to be gg is A. I B. IV C. III D. II

Use the diagram below to answer the question 48.



48. The type of protective adaptation exhibited by the animal is A. flash colouration B. counter shading colouration C. warning colouration D. disruptive colouration
49. The structure labeled I is A. tactile B. radio sensitive C. photosensitive D. chemoreceptive

2015 BIOLOGY SOLUTION

1. C: * Insects uses the tracheal system as their respiratory structure.

- Fishes possess paired gills for breathing in water.
- Since mouse is a mammal, its respiratory structure are a pair of lungs.

Compared to these organisms, the snail may be said to possess the most primitive respiratory system. Generally speaking, snails lack a particular respiratory organ. Air enters its mantle cavity

through respiratory pore/pneumostome where surrounding skin remains highly vascularised. Blood carries respiratory gases and participates in gas exchange.

2. B: Since hydrophytes are aquatic plants, they do not need sophisticated xylem tissues as water is readily available.

3. D: Since earthworm has a large surface area to volume ratio, diffusion is efficient as a mean of gaseous exchange.

4. C: This is the theory of use and disuse proposed by Jean Baptiste Lamarck.

5. D: The organisms in the kingdom Prokaryotae (Monerans) do not have well defined nuclei. The chromosomes are within the cytoplasm.

6. C: Nigeria has extensive mangrove forests in the coastal region of the Niger Delta. The Niger Delta mangrove is considered one of the most ecologically sensitive regions in the world.

7. A: The pancreatic juice contains amylase which acts on carbohydrate; lipase which acts on fats and oils and trypsin which acts on protein.

8. B: Bird flu or avian flu is an infectious type of influenza that spreads among birds; in rare cases, it can affect humans. Bird flu is a viral disease.

9. C: Pteridophytes (e.g. ferns) and Bryophytes (e.g. mosses) require water for fertilization.

10. C: The possession of facial hair in humans is almost restricted to males.

11. B: Montane vegetation in Nigeria is found mainly in Plateau State.

12. D: To successfully clone an organism, a single cell is sufficient.

13. A: The process of shedding the exoskeleton of an arthropod is known as ecdysis or moulting.

14. A: Lack of roughage in food causes constipation in humans.

15. A: The adrenal gland is situated above the kidney.

16. D: The most accurate way to identify a rapist is by conducting DNA analysis.

17. B: Aestivation is a state of animal dormancy characterized by inactivity and a lowered metabolic rate, that is entered in response to high temperature and arid conditions. It occurs in some insects, fishes, amphibians, tortoises, crocodiles, salamanders etc. The lungfish is an example of fishes that aestivate.

18. B: The opening and closing of the stoma are regulated by osmosis (in the guard cell)

19. C: Mosquito, housefly and blackfly all undergo complete metamorphosis. Their life cycles occur in four stages: Egg, larva, pupa and adult.

20. C: The underground habitat is highly likely to be dark, hence the eyes are not too useful here. The rat can find its way by using its vibrissae.

21. C: Weight of crucible = 5g; Weight of crucible + fresh soil = 10g; Fresh soil = 10 - 5g = 5g; Weight of crucible + heated soil = 8g; Weight of water lost = 10 - 8g = 2g

Percentage of water = $\frac{2g}{5g} \times 100 = 40\% = 0.4$

22. C: The waste product of plants used in the conversion of hide to leather is tannin.

23. A: The correct sequence is: Glomerulus → Bowman's capsule → Convolted tubule → Henle's loop → Collecting tubules

24. B: Male lizards attract their female counterparts by lowering the gular fold. The gular fold is a granular fold found on the ventral throat, located immediately in front of the forelegs.

25. C: The major photosynthetic pigment is the chlorophyll. Carotenoid is also a photosynthetic pigment. It must be remembered that the chloroplast is not a pigment but an organelle.

26. A: The ecosystem is the highest level of ecological organization.

27. B: Competition can be said to be a biotic factor since living organisms can compete with only living organisms.

28. A: Astigmatism is caused by uneven curvature of the cornea or lens (or both). Light rays are not focused on the retina evenly and consequently, the person is not able to focus objects horizontally and vertically.

29. B: The orange tree suffers as mistletoe. Penetrate its tissues to absorb nutrient. Thus, the association is rightly described as parasitism.

30. B:

Soil particle	Diameter of particle
Gravel	Above 2mm
Coarse sand	0.2mm - 2mm
Fine sand	0.02mm - 0.2mm
Silt	0.002mm - 0.02mm
Clay	Less than 0.002mm

Thus, the correct order is: Clay → Silt → Sand → Gravel

31. B: Drought comes with attendant scarcity of food. Thus, the rate of competition in a population is likely to be high when there is drought.

32. A: Stunted growth and poor root development are deficiency symptoms of phosphorous.

33. D: The mitochondrion is the organelle responsible for cellular respiration.

34. D: Genes are the units of heredity. Genes are located on the chromosomes. The chromosomes are found in the nucleus.

35. B: The process demonstrates the process of conjugation in Rhizopus. Conjugation is a form of sexual reproduction.

36. A: The structure labeled 'I' is the zygospore (an equivalent of zygote in the conventional sexual reproduction).

37. C: The structure labeled 'II' is the nucleus. The nucleus is responsible for sexual reproduction.

38. D: The part labeled 'IV' is the contractile vacuole. The contractile vacuole is responsible for osmoregulation.

39. C: The aorta is the largest artery of the body. The other artery (in the diagram) with two branches is the pulmonary artery.

40. A: Oxygenated blood is pumped to the entire body from the left ventricle through the aorta.

41. C: The experiment is to demonstrate thigmotropism

42. C: Auxins are produced from plant apices. Thus, it is expected that the highest concentration of auxin will be found at the apex.

43. C: The picture illustrates mating in toads.

44. D: Since laying of eggs is involved, the organisms are oviparous. Viviparity deals with giving birth to young ones alive.

45. Insulin is produced by the islets of langerhans in the pancreas.

46. C: Since acquired traits are not heritable, none of its offspring will be born without a tail.

47. B: If G for grey head is dominant over g, the dog without grey head must be gg.

48. B: The rat shows counter shading. Counter shading is a method of camouflage in which an

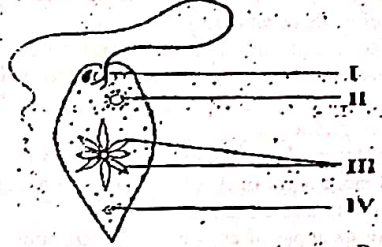
animal's colouration is darker on the upper side and lighter on the underside of the body.

49. A: The structure labeled 'I' is the vibrissae. The vibrissae is a tactile organ (i.e. it is sensitive to touch).

2014 U.T.M.E MODEL BIOLOGY QUESTIONS PAPER TYPE:

1. Which Question Paper Type of Biology is given to you? A. Type F B. Type E C. Type L D. Type S

Use the diagram below to answer questions 2 and 3.



2. The part labeled II is the A. eyespot B. basal granule C. contractile vacuole D. nucleus

3. The part responsible for photosynthesis is labeled A. IV B. I C. II D. III

4. The lowest level of organization in living organisms is A. cell B. system C. tissue D. organ

5. Which of the following is the most complex according to their cellular level of organization? A. Hair B. Euglena C. Hydra D. Heart

Use the diagram below to answer questions 6 and 7.



6. The organs for attachment to the lining of the host's intestine are labeled A. III and IV B. I and II C. I and III D. II and III

7. The young proglottid is represented by A. IV B. I C. II D. III

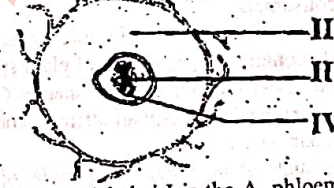
8. Which of the following organisms is multicellular? A. Spirogyra B. Amoeba C. Euglena D. Chlamydomonas

9. In bryophytes, sex organs are produced in the A. sporophyte B. gametophyte C. rhizoid D. protonema

10. Seed plants are the most dominant vegetation on land because of A. their ability to photosynthesize B. efficient seed dispersal C. availability of water D. their motile gametes

11. Which of the following is an aoreal organism? A. Fish B. Antelope C. Bird D. Elephant

Use the diagram below to answer questions 12 and 13.



12. The part labeled I is the A. phloem B. root hair C. cortex D. xylem

13. The diagram is the transverse A. dicotyledonous stem B. monocotyledonous root C. dicotyledonous root D. monocotyledonous stem

14. $i \frac{2}{1}, c \frac{0}{0}, pm \frac{3}{2}, m \frac{3}{3}$ The dental formula above represents that of A. a detritus feeder B. a carnivore C. a herbivore D. an omnivore

15. A circulatory system is very essential in mammals but not in smaller organisms like Amoeba because A. diffusion is sufficient to transport materials in Amoeba B. Amoeba lacks blood containing haemoglobin C. Amoeba exhibits, anaerobic respiration D. Amoeba lives in freshwater
16. In vascular plants, the sieve tubes and companion cells are present in the A. cortex B. xylem C. phloem D. cambium
17. The stomata of leaves are similar in function to the A. scales of fish B. spiracle of insects C. trachea of toads D. pharynx of humans
18. The use of moist skin for respiration in amphibians is known as A. cutaneous respiration B. buccal respiration C. pulmonary respiration D. cellular respiration
19. Water in plants is removed as water vapour through the process of A. osmosis B. evaporation C. transpiration D. diffusion
20. An example of an organ of perennation in plants is A. seed B. petal of a flower C. calyx of flower D. rhizome
21. Alternation of generation is a feature shown in A. fungi B. grasses C. conifers D. mosses
22. I. Growth is mainly apical II. Growth is specific with definite shape III. Growth is throughout life. Which of the above correctly describes the growth pattern in plants? A. II and III only B. I and II only C. I and III only D. I, II and III only
23. Coordination and regulation of body activities in mammals are achieved by the A. nerves and hormones B. nerves only C. hormones only D. nerves and muscles
24. The cerebellum of the brain controls A. muscular activity B. emotional expressions C. the endocrine system D. reflex actions
25. The part of the brain responsible for peristalsis is the A. medulla oblongata B. hypothalamus C. thalamus D. olfactory lobe
26. Which of the following instruments is used for measuring atmospheric pressure? A. Hygrometer B. Thermometer C. Barometer D. Hydrometer
27. The influence of soil on organisms in a habitat is referred to as A. physiographic B. biotic C. topographic D. edaphic
28. The genetic make-up of an organism is described as A. chromosome B. phenotype C. genotype D. allele
29. The major limiting factor of productivity in the aquatic habitat is A. temperature B. water C. sunlight D. food
30. Which of the following group of organisms feeds directly on green plants? A. Secondary consumers B. Producers C. Decomposers D. Primary consumers
31. A characteristic feature of tropical rainforest is that it A. contains large number of plant species B. contains fewer number of plant species C. has total annual rainfall of less than 50cm D. contains trees with narrow leaves
32. The study of how and why population size change over time is A. population dynamics B. population ecology C. population cycles D. population estimation
33. A severe and long dry season is a characteristic feature of A. mangrove swamps B. Sudan savanna C. Guinea savanna D. Sahel savanna
34. Which of the following is a nitrogen - fixing blue - green alga of soil? A. Nitrosomonas B. clostridium C. Anabaena D. Rhizobium

35. The soil with the highest water - retaining capacity is A. stoney soil B. sandy soil C. loamy soil D. clayey soil
36. The causative agent of poliomyelitis is A. fungus B. protozoan C. bacterium D. virus
37. One of the ways of controlling noise pollution in urban areas is A. that fuel should be completely combusted by engines B. by planting trees on both sides of the road C. by wearing ear devices D. by sitting industries away from residential areas
38. A constituent of the exhaust fumes from electricity generating sets which causes serious air pollution is A. water vapour B. ozone C. carbon (IV) oxide D. carbon (IV) oxide
39. Which of the following is true of small pox? A. It can effectively be controlled with antibiotics B. It can effectively be controlled by vaccination C. It is a water-borne infection D. It is transmitted by bacteria
40. A pollutant that is mostly associated with acid rain is A. ozone B. fluorine C. carbon (IV) oxide D. nitrogen (II) oxide
41. When the adults have reached a certain degree of weakness, the process of binary fission is replaced by conjugation in A. Euglena B. Amoeba C. Plasmodium D. Paramecium
42. Whorls, arches, loops and compounds are types of variation in A. fingerprints B. hair colour C. blood group D. eye colour
43. A couple has 10 children, all female. Which of the following best explains the situation? A. The man's sperm count is low B. The woman is not capable of producing male children C. The sex determination was by the man's Y chromosome D. The sex determination was by the man's chromosome
44. A biological agent with antiviral property is A. enzyme B. antibiotic C. disinfectant D. interferon
45. One of the advantages of out breeding is A. disease resistance B. fast growth C tall height D pests tolerance
46. An individual with blood group AB can receive blood from those in blood group(s) A. A, AB and O only B. AB only C. A and B only D. A, B, AB and O
47. The stream lined shape of fishes is an adaptation for A. easy movement B. obtaining food C. defence and attack D. securing mates
48. An example of poikilothermic organism is A. cockroach B. rabbit C. bird D. lizard
49. All living organisms are constantly involved in a struggle for existence. This was proposed by A. Darwin B. Lamarck C. Wallace D. Morgan
50. Adaptive radiation is illustrated in A. dentition in mammals B. wings in birds and bats C. appendages in insects D. modified insect mouthparts

2014 BIOLOGY SOLUTION QUESTIONS PAPER TYPE:

1. D: This is type S biology question paper
2. C: This structure labeled "II" is the contractile vacuole. The contractile vacuole performs the osmoregulatory function in the organism.
3. D: The organelle responsible for photosynthesis is the chloroplast. Chloroplast is represented by "III".
4. A: The cell is the lowest level of organization in living organisms. Next to the cell is the tissue, next to the tissue is the organ. And

finally, we have the system. Cell → tissue → organ → system

Increasing complexity

Increasing level of organization

5. D: Heart is an organ, hair is a cell, hydra occurs at the tissue level while euglena occurs at the cell level. Thus, heart is the most complex according to their cellular level of organization.
6. D: The tapeworm attaches itself to the intestine of the host with the use of hooks and suckers. The structure labeled "II" is the hook while "III" is the sucker.
7. A: The proglottides are produced by budding from the neck of a tapeworm. The young ones are close to the neck region. The farther away a proglottide is from the neck, the older it is.
8. A: Amoeba, Chlamydomonas and Euglena are unicellular organisms while spirogyra is a filamentous multicellular organism.
9. B: In bryophytes, sex organs are produced by the gametophyte. What about the protonema? It is only a precursor to gametophyte i.e. the gametophores grow from the protonema.
10. B: Seed plants form the most dominant vegetation because of their efficient seed dispersal.
11. C: Arboreal organisms are organisms that dwell on/in trees. Examples, are birds, monkeys, koalas, opossums etc.
12. B: The part labeled "I" is the root hair.
13. C: The presence of root hair indicates that the structure is a root. So, even if we are to make a guess, option A (dicot stem) and option D (monocot stem) are already out of the way. Now tell me; is it monocotyledonous root or dicotyledonous root? It is the latter. It is dicotyledonous root because a wide pith is absent. For a monocotyledonous root, a wide pith is always present.
14. C: $i = \frac{2}{1}$, $c = \%$, $pm = \frac{2}{2}$, $m = \frac{3}{3}$
- Since canine is absent ($c = \%$), the dental formula is that of a herbivore. Yes! In herbivores, there is no canine. Can you explain why canines are naturally missing in herbivores? Canines are used for tearing flesh. Since herbivores do not eat flesh, they have no use for canines. Is it understood? Good!
15. A: Small organisms like amoeba are able to do with diffusion for the transportation of materials. Thus, no special circulatory system is needed in such organisms. Diffusion is not efficient for transport in large organisms like mammals; hence the need for a circulatory system.
16. C: Four types of cells are present in the phloem: sieve tube, companion cells, phloem fibre and phloem parenchyma.
17. B: Gaseous exchange occurs in plants through the stomata. Insects also have tiny openings called spiracles in their abdomen through which oxygen diffuses into the body and carbon dioxide diffuse out. Thus, both stomata and spiracle are for gaseous exchange.
18. A: Amphibians exhibit three forms of respiration: The buccal respiration, the pulmonary respiration and the cutaneous respiration. The buccal respiration is through the mouth, pulmonary is through the lungs while cutaneous respiration is through the use of moist skin.
19. C: In plants, water is removed as water vapour by the process of transpiration. If transpiration occurs through the stomata, it is known as stomatal transpiration. If it occurs through the cuticle, it is cuticular transpiration. If the

channel is the lenticels, it is called lenticular transpiration.

20. **D:** The ability of an organism (a plant) to survive from one germinating season to another is known as perennation. The structures that enable such are known as perennating organs. These structures are dormant during unfavourable seasons. Examples of perennating organs are tubers, rhizomes, bulbs, stolons and rhizomes.

21. **D:** In alternation of generation, the gametophytes and the sporophytes alternately give rise to each other. It is commonly found in bryophytes (e.g. moss) and pteridophytes.

22. **C:** Growth in plants occurs at the apices (apical growth) while that in animals occur throughout the body of the animals. Growth in some plants also occur throughout life while animals stop growing at certain stages.

23. **A:** Coordination and regulation of body activities in mammals are achieved through nerves (nervous coordination and regulation) and hormone (hormonal coordination and regulation).

24. **A:** The cerebellum in association with the maintenance of balance and muscular movements.

25. **A:** The medulla oblongata controls involuntary movements and actions such as those concerned with respiration, digestion, heartbeat etc.

26. **C:** The atmospheric pressure is measured by the barometer. The hygrometer measures relative humidity. The thermometer measures temperature while the hydrometer is used for measuring relative density.

27. **D:** The influence of soil on organisms in a habitat is referred to as edaphic factor. This includes the effect of the soil texture, soil profile, soil pH, composition, structure etc.

28. **C:** Genotype refers to the genetic make-up of an organism. It refers to the totality of genes inherited by the organism.

29. **C:** The major limiting factor of productivity in the aquatic habitat is sunlight. The deeper an aquatic region, the less the amount of light that reaches there.

30. **D:** Green plants are the producers. The producers are fed on by the primary consumers which in turn are fed on by the secondary consumers which are also fed on by the tertiary consumers which finally are feasted upon by the decomposers.

31. **A:** The tropical rainforest has the greatest diversity of organisms.

32. **A:** The study of how and why the size of a population changes over time is known as population dynamics. Population cycle refers to the phenomenal rise and fall in the size of a population over a predictable period of time.

33. **D:** The Sahel savanna has a very low rainfall and a high temperature. The dry season is usually very long and severe. Of the various forms of savannas, sahel savanna is the driest.

34. **C:** Anabaena is a blue-green alga that is capable of fixing nitrogen. Clostridium and Rhizobium are also capable of nitrogen fixation but they are bacteria. Nitrosomonas convert ammonia to nitrite which is further converted to nitrate by another bacterium known as nitrobacter. Both another bacterium known as nitrobacter. Both nitrobacter and nitrosomonas are nitrifying bacteria.

35. **D:** Clayey soil has the highest water retaining capacity. Next to clayey soil is the loamy soil. Sandy soil has the lowest water retaining capacity.

36. **D:** Poliomyelitis is a disease characterized by headache, high fever, nausea, limb stiffness and occasional paralysis of the legs. Poliomyelitis is caused by poliovirus, a picomavirus from the family picomaviridae. It is a single stranded RNA virus.

37. **D:** Noise pollution can be controlled by sitting industries away from residential area.

38. **D:** Carbon (ii) oxide is a very poisonous substance. It can cause suffocation if inhaled. It competes with oxygen for attachment on haemoglobin. This means a bloodstream that has been polluted with carbon (ii) oxide will not host the adequate amount of oxygen required for living.

39. **B:** Small pox is a disease characterized by high fever, rashes and blisters. It can be effectively controlled by vaccination. Such vaccines contain live vaccinia virus.

40. **D:** Sulphur (iv) oxide is an acidic gas. It dissolves in water to produce an acidic solution. Thus, its presence in rain water causes acid rain. Acid rain is also caused by oxide of nitrogen.

41. **D:** Paramecium shows two forms of reproduction: Asexual reproduction and sexual reproduction. The asexual reproduction is by binary fission while the sexual reproduction is by conjugation.

42. **A:** Fingerprints are the impressions of the ridges on the ends of our fingers and thumbs. There are four major types of fingerprints in man. Each individual must have one of these four. The types are arch, loop, whorl and compound.

43. **D:** In males, the sex chromosomes are X and Y while in females, all the sex chromosomes are X. This entail that a sperm may carry X-chromosome or Y-chromosome (and not the two together) while an egg can only carry X-chromosome. If the sperm with X-chromosome fertilizes the egg (which always carries X-chromosome as explained earlier), the baby will be XX (female). On the other hand, a sperm with Y-chromosome will fertilize an egg to give XY (Male). For a couple to have 10 children, all female, it must be that the X-chromosome from the man is involved all along.

44. **D:** Interferons are proteins which are produced by cells in response to the presence of pathogens. Interferons are both antibacterial and antiviral in action. They serve to modulate the functions of the immune system.

45. **A:** Outbreeding yields varieties which are highly resistant to diseases. The offspring are also of superior qualities.

46. **D:** The blood group AB is known as the universal recipient as people with the blood group can receive blood from people with any blood group. Thus, AB can receive from A, B, AB and O. O is known as the universal donor as it can donate to all.

47. **A:** The stream-lined shape of fishes enhances easy movement in water.

48. **D:** A poikilothermic organism is an organism whose body temperature is not constant but changes with that of the environment. Homoeothermic organism on the other hand has a constant body temperature. Pisces (fishes), Amphibians and Reptiles are poikilothermic while Aves (birds) and Mammals are homoeothermic organisms. Lizard is poikilothermic since it is a Reptile.

49. **A:** This is one of the statements of Charles Darwin's theory of natural selection.

50. **D:** Adaptive radiation is a process in which organisms give rise to a multitude of new forms. This commonly occurs when a change in the

environment creates more resource availability and more changes. An example of adaptive radiation is modified insect mouth parts. It also occurs in other structures such as wings (in birds, insects and bats), bivalve, siphons etc.

U.T.M.E BIOLOGY 2013

QUESTIONS PAPER TYPE: D

1. Which Question Paper Type of Biology is given to you? A. Type D B. Type L C. Type B D. Type U

2. The process in which complex substances are broken down into simpler ones is referred to as A. metabolism B. tropism C. anabolism D. catabolism

3. The organ which is sensitive to light in Euglena is the A. chloroplast B. eyespot C. gullet D. flagellum

4. The organelles present in cells that are actively respiring and photosynthesizing are A. nucleus and centrioles B. mitochondria and chloroplast C. lysosomes and ribosomes D. Golgi apparatus and endoplasmic reticulum

5. *Taeniasolium* can be found in A. dog B. pig C. cow D. goat

Use the diagram below to answer questions 6 and 7.



6. The structure labeled II is the A. clitellum B. chaetae C. spermathecal pore D. cocoon

7. The organism is found in soils rich in A. clay B. sand C. mud D. humus

8. Which of the following describes a characteristic of arthropods? A. The body is not divided into a number of segments B. The body is covered by chitin C. The organism finds it easy to grow freely D. The organism has a pair of jointed appendages.

9. Which of the following distinguishes a butterfly from a moth? A. They have similar antennae B. The abdomen of moth is fatter than that of butterfly C. The wings of butterfly rest horizontally but those of moth rest vertically D. Both are active during the day.

10. Which of the following types of feathers is used for flight in birds? A. Covert B. Down C. Quill D. Filoplume

11. The plants that grow in deserts or very dry areas are referred to as A. epiphytes B. xerophytes C. mesophytes D. hydrophytes.

12. Which of the following is the simplest living organism? A. Amoeba B. Chlamydomonas C. Paramecium D. Virus.

13. Proboscis is a structure that is mostly found in A. amphibians B. mollusks C. insects. D. tapeworms

14. The structural adaptation of desert plants for water conservation is A. spiny leaves B. prominent stomata in leaves C. broad leaves with numerous stomata D. spongy mesophyll

15. The long and sharp clawed feet of birds is an adaptation for A. tearing flesh B. grasping prey C. crushing seeds D. scooping mud

16. During the manufacture of food by plants, which of the following organisms use energy from the sun? A. *Nitrosomonas sp* B. *Nitrobacter sp* C. *Anabaena D. Sulfur bacteria*

17. Movement of minerals and chemical compounds within a plant occurs during A. transpiration B. diffusion C. osmosis D. translocation

18. The enzyme that is present in the saliva is A. pepsin B. ptyalin C. rennin D. lipase

19. Plants that have special devices for trapping and digesting insects are A. parasitic B. saprophytic C. carnivorous D. symbiotic
20. The process of transforming the chemical energy of cellular fuels into the high energy bonds of ATP in plants is A. photolysis B. respiration C. autotrophism D. photosynthesis
21. Fungi are referred to as heterotrophs because they A. have mycelium B. lack roots C. are filamentous D. lack chlorophyll
22. An example of a parasitic protozoan is A. Euglena B. Chlamydomonas C. Paramecium D. Plasmodium
23. Which blood cells are involved in the immune response of vertebrates? A. Erythrocytes B. Monocytes C. Phagocytes D. Lymphocytes
24. The blood circulatory system of vertebrates consists of A. heart, aorta, arteries and veins B. heart, vena cava, arteries and veins C. heart, arteries, capillaries and veins D. heart, aorta, capillaries and veins
25. A plant tissue that carries water and mineral salts is the A. cortex B. phloem C. cambium D. xylem
26. Which of the following helps in the clotting of blood? A. Plasma B. Platelets C. Red blood cells D. White blood cells
27. Which of the following forms about 55% of the volume of the blood in man? A. Plasma B. Erythrocytes C. Leucocytes D. Platelets
28. The part of the mammalian skin involved in excretion is the A. sebaceous gland B. horny layer C. sweat gland D. Malpighian layer
29. Which of the following is a waste product of an insect? A. Sweat B. Mucilage C. Alkaloids D. Uric acid
30. The main structure in vertebrates that supports and protects the body is the A. muscle B. joint C. skeleton D. ligament
31. The chitin in the exoskeleton of many arthropods is strengthened by A. calcium compounds B. organic salts C. lipids D. proteins.
32. The transfer of pollen grains from the anther to a receptive stigma is A. pollination B. fertilization C. propagation D. placentation
33. The male reproductive organ of a flower is the A. petal B. sepal C. carpel D. stamen
34. The gland that is found just below the hypothalamus is the A. pituitary B. thyroid C. parathyroid D. adrenal
35. The most important plant hormone is A. auxin B. gibberellin C. cytokinin D. abscisic acid
36. The sensory cell that responds to dim light is referred to as the A. rod B. iris C. cone D. lens.
37. The absence of anti-diuretic hormone in humans results in A. eliminating dehydration B. increasing dehydration C. decreasing dehydration D. drastic dehydration.
38. Oestrogen is a hormone that is synthesized in the A. anterior pituitary B. adrenal cortex C. ovaries D. testes
39. The eye defect caused by the development of cloudy areas in the lenses, is A. cataract B. astigmatism C. presbyopia D. glaucoma
40. A pollutant that is biodegradable is A. cellophane B. sewage C. crude oil D. heavy metals
41. A tropical disease caused by Trypanosoma is A. yellow fever B. malaria C. sleeping sickness D. river blindness
42. The solid part of the ecosystem is referred to as the A. biosphere B. lithosphere C. atmosphere D. hydrosphere.

43. Which of the following is caused by *Treponema pallidum*? A. Tuberculosis B. Syphilis C. Gonorrhoea D. Leprosy.
44. To which blood group do universal recipients belong? A. O B. AB C. B. D. A
45. The clumping together of red blood cells is A. transfusion B. compatibility C. agglutination D. fusion
46. Physiological adaptation to very dry conditions in animals demonstrates A. hibernation B. aestivation C. rejuvenation D. xeromorphism
47. One adaptation of *Cactusopuntia* to conserve water is the reduction of A. leaves to spine B. flower size C. internodes D. stem to leaves
48. Which of the following structures is adapted for feeding in a bird of prey? A. Big beaks and strong feet B. Pointed beak and strong claws C. Hooked beak and sharp claws D. Smooth beak and strong claws
49. The special pigment for colour change in chameleon is A. chromatin B. chromatophore C. melanin D. carotenoid
50. The behavioural adaptation in social insects could best be described as A. parasitism B. commensalism C. symbiosis D. saprophytism

U.T.M.E BIOLOGY 2013 SOLUTION QUESTIONS PAPER TYPE: D

- A: This is type D biology question paper.
 - D: Catabolism is a process in which complex organic substances are broken-down to give simpler ones. An example is cellular respiration. Anabolism, on the other hand, is a process in which simpler substances merge to give a complex one. An example is photosynthesis.
 - D: The light sensitive piece in Euglena is known as the eyespot. The eyespot, which is situated around the gullet end in the organism, is a cluster of reddish pigment.
 - B: Mitochondria are responsible for respiration while chloroplasts are responsible for photosynthesis.
 - C: The two common species of tapeworm are *Taenia solium* and *Taenia saginata*. *Taenia solium* is found in pigs while *Taenia saginata* is found in cattle.
 - A: "II" is clitellum. The clitellum produces a mucous ring into which eggs and sperms are released.
 - D: The organism (earthworm) is found in soils that are rich in humus.
 - B: The body of arthropods is covered by chitin.
 - Their bodies are segmented i.e. divided into a number of segments.
 - They do not grow easily as they will need to undergo moulting or ecdysis (shedding of chitin) before they can grow.
 - Although they have jointed appendages, the number of such is never one in any arthropod.
 - C: The following are the differences between butterflies and moths
 - Butterflies are diurnal while moths are mostly nocturnal.
 - The wings of butterflies rest horizontally while those of moths rest in a flat manner against the body.
 - The antennae of butterflies have knobs at their tips while those of moths have pointed tips.
 - The pupae of moths are enclosed in cocoons while those of butterflies are not.
- Butterflies are normally colourful while moths are usually dull coloured.
10. C: Quill Feathers are found on the wings and tail. They are used for flying and steering. Contour or covert feathers help to keep the body warm.
- Down feathers are found between the contour feathers. They aid to keep the body warm.
11. B:
- Xerophytes are plants that grow in deserts or very dry area.
 - Mesophytes are land plants that are found in habitats with adequate supply of water.
 - Hydrophytes are plants that live in water or very wet environments.
 - Epiphytes are those plants that dwell on other plants without obtaining nutrients from them.
12. D - Viruses are the simplest living organisms. A virus is qualified to be tagged as a living thing, as well as a non-living thing. Viruses become crystalline (non-living), when outside the living cells.
13. C - All insects have mouthparts whose modification depends on the food the insects eat. The mouthparts consist of mandible, maxilla, labium, labrum, maxillary palp, labial palp and the hypopharynx. The sucking mouthpart is known as proboscis.
14. A - There are many ways desert plants are structurally adapted to their habitat. Some of them are:
- Possession of spiny leaves
 - Possession of water storage cells
 - Possession of well developed roots
 - Absence of large leaves
15. B - The type of food a bird feeds on determines the type of beak and feet it has. Carnivorous birds have strong beaks with long and sharp claws on their feet to facilitate easy grasping of prey. Birds that feed on insects have short and fine beaks that can pick insect easily. Those that feed on seeds have short thick beaks.
16. C - Photosynthetic organisms make use of sunlight energy while chemosynthetic organisms do not. Chemosynthetic organisms make use of energy produce from chemical reactions. Sulphur bacteria, *Nitrosomonas spp.* and *Nitrobacter spp.* are chemosynthetic. Anabaena is a blue-green alga. It makes use of sunlight energy since it is a photoautotroph.
17. D -
- Transpiration is the loss of water, in form of water vapour, through the stomata, lenticels or cuticle
 - Diffusion is the movement of molecules from the region of higher concentration to the region of lower concentration until even distribution is attained.
 - Osmosis is the movement of water molecules from the region of lower solute concentration to the region of higher solute concentration through a differentially permeable membrane.
 - Translocation is the transport of manufactured food substances from the leaves to all parts of the plant.
18. B - The enzyme that is present in saliva is ptyalin. It converts starch to maltose. Pepsin and rennin are present in the stomach. Pepsin converts proteins to peptones while rennin curdles milks. Lipase is found in the duodenum and ileum. It converts fats and oils to fatty acid and glycerol.
19. C: Plants that have special devices for trapping and digesting insects are known as

carnivorous or insectivorous plant. It is not as if the plants cannot photosynthesize. They feed on insects and other small organisms to supplement their nitrogen intake. Examples are sundew, venus fly trap, bladderwort, butterwort, utricularia and pitcher plant.

20. **B:** The transformation of chemical energy of cellular fuels into the high energy bonds of ATP occurs during respiration.

21. **D:** Organisms that cannot manufacture their own food are called heterotrophs. Fungi are heterotrophs since they lack chlorophyll. They show saprophytic mode of nutrition.

22. **D:** A parasite is an organism that depends on another organism for its survival. Those that live outside the body of the hosts (the organisms upon which depend) are called ectoparasites while those that live inside the body of the hosts are called endoparasites. Plasmodium is an endoparasite of human. It causes malaria.

23. **D:** The white blood cells are of two major types, namely the granulocytes and the agranulocytes. The agranulocytes are also subdivided into monocytes and lymphocytes. The main active component of the adaptive immune system are the lymphocytes. The lymphocytes produce antibodies which protect the body from pathogens. Monocytes defend the body by ingesting or engulfing harmful microorganisms that enter the blood.

24. **C:** The blood circulatory system of vertebrates is made up of the heart, arteries, veins and capillaries. Aorta is the largest artery of the body while the vena cava is the largest vein.

25. **D:** Phloem and xylem are responsible for the conduction of materials in plants. Phloem transports manufactured food from the leaves to other parts of the plant. Xylem transports water and mineral salts from the soil to the various parts of the plant.

26. **B:** The blood cells or corpuscles are three in number: The red blood cells (erythrocytes), the white blood cells (leucocytes) and the thrombocytes (blood platelets). The red blood cells carry oxygen round the body, the white blood cells protect the body while the blood platelets aid in blood clotting.

27. **A:** The blood plasma, which is the liquid portion of the blood, forms about 55% of the entire blood volume. The remaining 45% goes to the blood corpuscles and others.

28. **C:** Since sweat is an excretory product and sweat is produced by sweat glands, the sweat gland performs an excretory role.

29. **D:** The excretory product in insects is uric acid. This acid is produced by the malpighian tubules. The production of uric acid by the insects is actually a way to conserve water as the substance (uric acid) consequently excreted contains only a very small amount of water.

30. **C:** The skeleton is the bony framework of the body which provides support and protection.

- Muscles act mainly to produce motion.
- A joint is a point where two or more bones meet

• A ligament is a structure that joins two bones together.

31. **A:** The chitin in the exoskeleton of arthropods is strengthened by calcium compounds. Chitin is generally a nitrogenous polysaccharide.

32. **A:** Pollination is the transfer of pollen grains from the anther of a plant to a receptive stigma.

33. **D:** The stamen is the male reproductive organ of a flower while the carpel is the female reproductive organ.

34. **A:** The pituitary gland, which is also known as the master gland, is found just below the hypothalamus. The thyroid gland is found in the neck below larynx. The parathyroid gland is located at the back surface of the thyroid lobes. The adrenal gland is found at the top of the kidney.

35. **A:** Auxins are the most important plant hormones (plant growth substances). After the auxins come the gibberellins.

36. **A:** The sensory cells in the eyes are of two types: The rod cells and the cone cells. Rod cells function mainly in dim light while cone cells function in bright light. Rod cells are responsible for black and white vision while cone cells are for colour vision.

37. **D:** The anti-diuretic hormone (ADH) stimulate the kidney to absorb water from the collecting tubules. It helps to conserve body water by reducing the loss of water in urine.

38. **C:** Oestrogen is a reproductive hormone which is responsible for the development of female secondary sexual characteristics. It is produced by the ovaries.

39. **A:** Cataract occurs as a result of cloudiness of some areas in the eye lenses. Glaucoma is a progressive loss of vision due to damaged optic nerve. Presbyopia is the loss of clear vision which is associated with old age.

40. **B:** Biodegradable substances are those substances that can be broken down to a harmless natural state by the action of microorganisms. Those that cannot be so broken are said to be non-biodegradable. Sewage is biodegradable while cellophane, crude oil and heavy metals are non-biodegradable.

41. **C:** Yellow fever is caused by a virus whose vector is the Aedes mosquito.

- Malaria is caused by a protozoan known as plasmodium.
- Sleeping sickness (also known as trypanosomiasis) is caused by a protozoan known as trypanosome.
- River blindness (also known as onchocerciasis) is caused by *Onchocercavolvulus*.

42. **B:** The biosphere refers to the part of the earth where life exists.

- The lithosphere is the solid portion of the earth
- The atmosphere is the gaseous portion
- The hydrosphere is the liquid portion

43. **B:** Syphilis, a sexually transmitted disease, is caused by *Treponema pallidum*.

44. **B:** Blood group AB is the universal recipient. Group O is the universal donor.

45. **C:** The clumping together of red blood cells is known as agglutination. It occurs when blood samples with contrasting antigens and antibodies are mixed.

46. **B:** Aestivation is a state of dormancy where animals are inactive and have low metabolic rates during hot or dry period. Aestivation performs protective role for those animals.

47. **A:** Cactus opuntia is a xerophytic plant (desert plant) possession of spiny leaves is a structural adoption to conserve water. Please, refer to the solution to question 14 for further points.

48. **C:** Refer to the solution to question 15.

49. **B:** Chameleons have specialized cells known as chromatophores. The cells contain

pigments with which chameleons are able to change their colour.

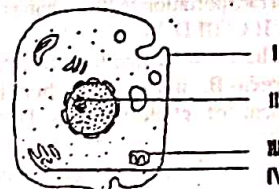
50. **C:** Since social insects exhibit division of labour, they benefit from one another. For instance, the soldiers protect the workers while the workers in turn provide food for the soldiers. Hence, their associated is best described as symbiosis (mutualism).

UTME BIOLOGY 2012

Question Paper Type: YELLOW

1. Which Question Paper Type of Biology as indicated above is given to you? A. Type Green B. Type Purple C. Type Red D. Type Yellow.

Use the diagram below to answer questions 2 and 3.



2. The organelle responsible for heredity is labeled A. I B. II C. III D. IV

3. The part labeled IV is the A. mitochondrion B. cell wall C. endoplasmic reticulum D. nucleus

4. Which of the following is most advanced in the evolutionary trend of animals? A. Liver fluke B. Earthworm C. Snail D. Cockroach.

5. Which of the following is the lowest category of classification? A. Class B. species C. family D. genus

6. Plants that show secondary growth are usually found among the A. thallophytes B. pteridophytes C. monocotyledons D. dicotyledons

7. The fungi are a distinct group of eukaryotes mainly because they have A. spores B. no chlorophyll C. many fruiting bodies D. sexual end asexual reproduction

8. An arthropod that is destructive at the early stage of its lifecycle is A. butterfly B. mosquito C. bee D. millepede.

9. An animal body that can be cut along its axis in any plane to give two identical parts is said to be A. radially symmetrical B. bilaterally symmetrical C. asymmetrical D. symmetrical.

10. Which of the following possesses mammary gland? A. Dogfish. B. Whale. C. Shark. D. Catfish.

11. The feature that links birds to reptiles in evolution is the possession A. feathers B. beak C. skeleton D. scales

12. Counter shading is an adaptive feature that enables animals to A. fight enemies B. remain undetected C. warn enemies D. attract mates.

13. Which of the following plant structures lacks a waterproof cuticle? A. Leaf. B. Stem. C. Root. D. Shoot.

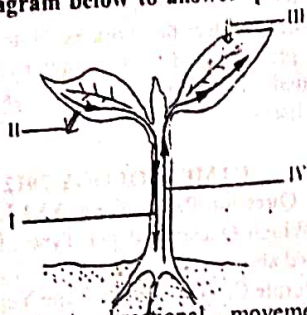
14. In the mammalian male reproductive system, the part that serves as a passage for both urine and semen is the A. urethra B. ureter C. bladder D. seminal vesicle.

15. In plants, which of the following is required in minute quantities for growth? A. Copper. B. Potassium. C. Phosphorus. D. Sodium.

16. Which of the following organisms is both parasitic and autotrophic? A. Sundew B. *Loranthus* C. *Rhizopus* D. Tapeworm.

17. A function of the hydrochloric acid produced in the human stomach during digestion is to A. neutralized the effect of bile B. coagulate milk protein and emulsify fats C. stop the action of ptyalin D. break up food into smaller particles.

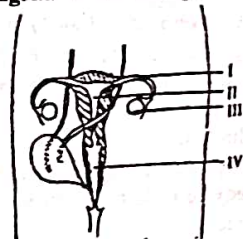
18. Which of the following is a polysaccharide? A. Glucose. B. Sucrose. C. Maltose D. Cellulose.
Use the diagram below to answer questions 19 and 20.



Arrows represent directional movement of materials

19. Transportation in the xylem is represented by A. I B. II C. III D. IV
20. The arrow labeled II represents the A. release of oxygen B. intake of carbon (IV) oxide C. movement of photosynthates D. movement of nutrients.
21. In the kidney of mammals, the site of ultrafiltration is the A. uriniferous tubule B. Bowman's capsule C. loop of Henle D. renal tubule
22. Which of the following is involved in secondary thickening in plants? A. Collenchyma and xylem cells. B. Vascular cambium and collenchyma cells. C. Vascular cambium and cork cambium D. Cork cambium and sclerenchyma.
23. An example of a fruit that develops from a single carpel is A. okro B. tomato C. bean D. orange.

Use the diagram to answer questions 24 and 25.

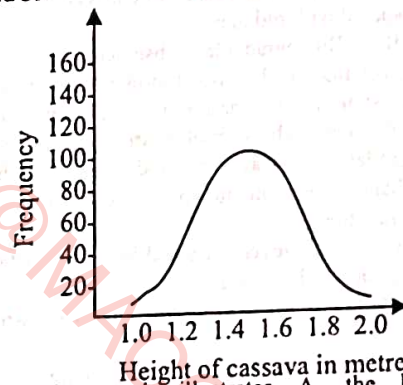


24. The developing embryo is usually contained in the part labeled A. IV B. III C. II
25. The function of the part labeled III is to A. produce egg cells B. protect sperms during fertilization C. secrete hormones during coitus D. protect the developing embryo.
26. Plant growth can be artificially stimulated by the addition of A. gibberellin B. kinin C. abscisic acid D. ethylene.
27. The autonomic nervous system consists of neurons that control the A. voluntary muscles B. heart beat C. tongue D. hands
28. Plants of temperate origin can be grown in tropical areas in the vegetation zones of the A. rain forest B. Guinea savanna C. Sudan savanna D. montane forest
29. The water cycle is maintained mainly by A. evaporation of water in the environment B. evaporation and condensation of water in the environment C. condensation of water in the environment D. transpiration and respiration in plants.
30. Organisms living in an estuarine habitat are adapted to A. withstand wide fluctuations in temperature B. survive only in water with low salinity C. withstand wide fluctuations in salinity D. feed only on phytoplankton and dead organic matter
31. The presence of stilt roots, pneumatophores, sunken stomata and salt glands are adaptive features of plants found in the A. tropical rainforest

- B. mangrove swamps C. grassland D. montane forest

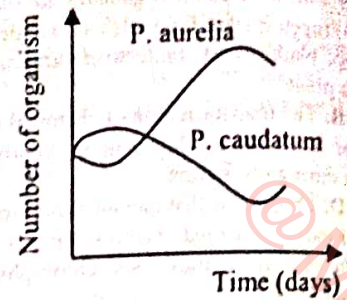
32. Which of the following animals can exist solely on the water they get from food and metabolic reactions? A. Forest arboreal dwellers B. Desert dwellers C. Forest ground dwellers D. Rainforest dwellers.
33. The most likely first colonizers of a bare rock are A. mosses B. ferns C. lichen D. fungi.
34. The carrying capacity of a habitat is reached when the population growth begins to A. increase slowly B. increase exponentially C. slow down D. remain steady
35. The abiotic factors that control human population include A. disease and famine B. space and rainfall C. flooding and earthquake D. temperature and disease.
36. An indigenous method of renewing and maintaining soil fertility is by A. clearing farms by burning planting one crop type C. adding inorganic fertilizers yearly D. crop rotation and shifting cultivation
37. The diseases caused by water-borne pathogens include A. gonorrhoea and poliomyelitis B. typhoid and syphilis C. tuberculosis and cholera D. typhoid and cholera.

Use the diagram below to answer questions 38 and 39



38. The graph illustrates A. the highest frequency for height of 2 metres B. a discontinuously varying character C. a continuously varying character D. total yield in a cassava farm.
39. The largest number of cassava plants has an approximate height of A. 1.4m B. 1.6m C. 1.8m D. 2.0m
40. Which of the following is true in blood transfusion? A. A person of blood group AB can donate blood only to another person of blood group AB. B. Persons of blood groups A and B can donate or receive blood from each other C. A person of blood group AB can receive blood only from persons of blood group A or B. D. A person of blood group O can donate only to a person of blood group O.
41. A yellow maize is planted and all the fruits obtained are of yellow seeds. When they are cross-bred, yellow seeds and white seeds are obtained in a ratio 3:1. The yellow seed is said to be A. non-heritable B. sex-linked C. a recessive trait D. a dominant trait.
42. When a colour-blind man marries a carrier woman. What is the probability of their offspring being colour blind? A. 25% B. 50% C. 75% D. 100%
43. The correct base pairing for DNA is A. adenine → thymine and guanine → cytosine B. adenine → guanine and thymine → cytosine C. adenine → cytosine and guanine → thymine D. adenine → adenine and cytosine → cytosine.

Use the diagram below to answer questions 44 and 45.



44. The type of interaction shown is referred to as A. interspecific competition B. intraspecific competition C. mutualism D. cooperation.
45. Which of the following statement is true of the interaction? A. *P. aurelia* is better adapted for obtaining food than *P. caudatum* B. *P. caudatum* is better adapted for obtaining food than *P. Aurelia* C. Both organisms cannot coexist D. Both organisms cannot reproduce
46. The short thick beak in birds is an adaptation for A. crushing seeds B. sucking nectar C. tearing flesh D. straining mud.
47. The basking of Agama lizards in the sun is to A. change the colour of their body B. raise their body temperature to become active C. fight to defend their territories D. attract the female for courtship...
48. The significance of a very large number of termites involved in nuptial swarming is to A. provide birds with plenty of food B. ensure their perpetuation despite predatory pressure C. search for a favourable place to breed D. ensure that every individual gets a mate.
49. The use and disuse of body parts and the inheritance of acquired traits were used to explain A. Darwin's theory B. Lamarck's theory C. genetic drift D. gene flow.
50. From his study of Galapagos finches, Darwin derived his theory of evolution from A. comparative anatomy B. comparative physiology C. fossil remains D. comparative embryology.

UTME BIOLOGY 2012 SOLUTION Question Paper Type: YELLOW

1. D: This is type yellow biology question.
2. B: The structure labeled "II" is the nucleus. The nucleus, which is the most important organelle, is responsible for heredity. It is also the chief coordinator of all the activities of a cell.
3. A: The part labeled "IV" is endoplasmic reticulum. It is worthy of notice that the endoplasmic reticulum occurs in two - If it has ribosomes attached to its surface, it is a Rough Endoplasmic Reticulum, if it doesn't, it is a Smooth Endoplasmic Reticulum.
4. D: The evolutionary trend among invertebrates is: Protozoa → Coelenterata → Platyhelminthes → Nematode → Annelida → Mollusca → Arthropoda → Echinodermata. We can employ the acronym PCPNAMAE (pronounced as pii-sii-pii-na-ma-hee!) Liverfluke is a platyhelminth, earthworm is an annelid, snail is a molluscan while cockroach is an arthropod. It is crystal clear that the cockroach is the most advance.
5. B: The species is the lowest category of classification; the kingdom is the highest category. The hierarchy goes as: Kingdom → Phylum (or division for plant) → Class → Order → Family → Genus → Species. Just remember KPCOFGS (Key: pii-kof-gii-ess!)

6. **D:** Secondary growth or secondary thickening is characteristics of dicotyledonous plants. A plant that shows secondary growth or thickening grows both in height and width

7. **C:** No! It can't be spores - there are many organisms that are spore - producing. No! It is not lack of chlorophyll that makes fungi unique. No again! The ability to show both sexual and asexual reproduction is very common among lower organisms and very cheap (almost a dozen a dime). The unique feature of fungi is the possession of many fruiting bodies

8. **A:** The young forms of butterflies (known as the caterpillars) are plant pests.

9. **A:** A radially symmetrical body is the one that can be cut along its axis in any plane to give two

10. **B:** The possession of mammary gland and hair distinguishes mammals from other groups of animals. Dogfish, Shark and Catfish are fishes while Whale, though aquatic, is a mammal

11. **D:** The possession of scales links birds to reptiles. Recall that the birds are next to the reptiles in the vertebrate evolutionary trend. Pisces → Amphibians → Reptiles → Aves (Birds) → Mammals (say PARAM).

12. **B:** Counter shading is an adaptation for protection. It enables an animals to remain undetected in its environment, with this it can escape predation.

13. **C:** The root does not have water - proof cuticles. Is this design an advantage or disadvantage? If roots were to have water-proof cuticles, the absorption of water from the soil would be impossible.

14. **A:** The urethra is urinogenital in function - it serves as a passage for both urine and semen. The urethra should not be confused for the ureter, which is a structure that passes urine from the kidney to the bladder

15. **A:** Elements or nutrients that are required in large quantities are called major elements or macronutrients while those that are needed in small quantities are called minor elements or micronutrients. Potassium, Sodium, Phosphorous are major elements. Examples of minor elements are Copper, Molybdenum, Zinc, Manganese and Boron

16. **A:** It is not like carnivorous or insectivorous plants cannot photosynthesize, they can, however; these plants are normally found in areas poor in nitrogen. They need to get their own dose of nitrogen too, either by hook or crook. This is why they trap insects in order to obtain soluble nitrogenous compounds.

17. **C:** The HCl produced in the human stomach serves a number of roles:

- It kills germs contained in food
- It provides an acidic environment for gastric enzymes to act
- It neutralizes the alkalinity of saliva - This is where we are going! The enzyme ptyalin present in saliva only works in alkaline medium. Now that HCl has neutralized the alkalinity of the saliva, the action of ptyalin has been consequently stopped.

18. **D:** Glucose, galactose, fructose and mannose are monosaccharide. Sucrose, maltose and lactose are disaccharides. Starch, cellulose etc. are polysaccharide.

19. **D:** The xylem transports water and mineral salts from the soil upwards (as shown by "IV". The phloem transports manufactured food substances from the leaf to other parts of the plant (as shown by "I")

20. **A:** The arrow labeled "II" depicts the release of oxygen into the environment. When does this happen? Good! During photosynthesis.

21. **B:** Ultrafiltration occurs in the Bowman's capsule.

22. **C:** In gymnosperms and dicotyledons, growth does not only take place by the activities of apical root, apical stem and intercalary meristems but also by the activities of the vascular cambium and cork cambium to bring about increase in the diameter of the roots and stem. This is known as secondary growth.

23. **C:** A legume is a simple fruit developed from a superior monocarpous pistil; bean is a legume.

24. **C:** The developing embryo is usually contained in the part labeled "II". The part is known as the uterus or womb.

25. **A:** The part labeled "III" is the ovary. The ovary produces egg cells.

26. **A:** Plant growth can be artificially stimulated by the addition of gibberelin. Gibberelin is known to stimulate the growth of root and stem.

27. **B:** The autonomic nervous system is concerned with involuntary body activities e.g. breathing, heart beat etc.

28. **B:** A plant of temperate origin will do well in tropical areas in the vegetation zones of the Guinea Savanna.

29. **B:** Water escapes and returns to the ecosystem mainly by evaporation and condensation respectively.

30. **C:** Organisms in estuarine habitat must be adapted to fluctuations in salinity as an estuary is a blend of fresh water and salty water.

31. **B:** the presence of stilt roots, pneumatophores, sunken stomata and salt glands are adaptive features of plants found in the mangrove swamps.

32. **B:** A desert is characterized by little rainfall (less than 25 mm of rainfall per year). As such, plants living in deserts must get adapted to insufficiency of water. Their major sources of water are food (water therefrom) and metabolism.

33. **C:** The first colonizers of a bare rock are usually the lichens. A lichen comprises a fungus and an alga.

34. **D:** The carrying capacity of a habitat is reached when the population growth begins to remain steady.

35. **C:** Biotic factors refer to living factors while abiotic factors are the non-living factors. With respect to the human population, flooding and earthquake are probable abiotic factors affecting the size.

36. **D:** Crop rotation and shifting cultivation are effective natural methods for maintaining soil fertility.

37. **D:** Typhoid and Cholera are caused by water-borne pathogens; tuberculosis is air-borne while gonorrhoea and syphilis are sexually transmitted.

38. **C:** The graph illustrates the various heights of cassava. Height, body weight, size of body part, colour of the skin etc. are continuous variations.

39. **B:** The highest frequency (about 140) corresponds to a height of 1.6 m.

40. **A:** O is the universal donor, it can donate to all. AB is the universal recipient, it can receive from all. O can only receive from another while AB can only donate to another AB.

41. **D:** Yellow is said to be dominant as it is able to initially mask the white colour.

42. **B:** Colour blindness is a sex linked character. Being a recessive trait, a female will only suffer from colour blindness if both x-chromosomes are defective. A man is either normal or suffers from it; never a carrier! Let x^c represent the x-chromosome afflicted with colour blindness

	X ^c	X
X ^c	X ^c X ^c	X ^c X
Y	X ^c Y	XY

43. **A:** Guanine will always pair with cytosine while thymine always pairs with adenine.

44. **A:** Interspecific competition involves organisms of different species while intraspecific competition involves those of the same species. *P. Aurelia* and *P. caudatum* are two different species of paramecium.

45. **A:** Since *P. aurelia* occurs in greater number than *P. caudatum*, the former is more adapted than the latter.

46. **A:** Short thick beaks are adapted for crushing seeds. Long, narrow and tubular beaks are for sucking fluid food. Flattened and broad beaks with grooved sides are for sifting out food from water and mud.

47. **B:** Agama lizards bask in the sun to acquire heat - This enhances temperature regulation.

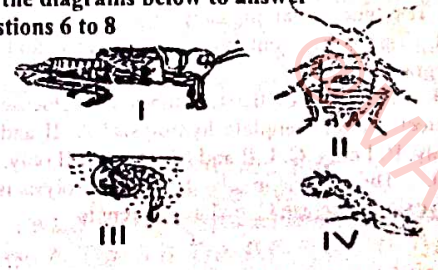
48. **B:** Termites swam in large numbers during nuptial swarming so as to withstand predatory pressure.

49. **B:** The theory of use and disuse was propounded by Jean Baptiste Lamarck.

50. **A:** Charles Darwin derived the theory of natural selection from his observation of finches from the Galapagos Islands. Darwin observed that the finches had dissimilar beaks. He therefore concluded that natural selection shaped the beaks differently. Since anatomy deals with body structures, it can be said that he derived his theory of evolution from comparative anatomy.

**U. T. M. E BIOLOGY 2011
QUESTIONS PAPER TYPE: B**

- Which Question Paper Type of Biology is given to you? A. Type A. B. Type B C. Type C D. Type D.
 - The function of the red head in male *Agama* lizards is to A. scare other males from the territory B. attract female lizards for mating purposes C. warn predators of the distastefulness of the animal D. conceal and camouflage the animal from predators.
 - In which of the following species is the biomass of an individual the smallest? A. *Agama* sp B. *Bufo* sp C. *Spirogyra* sp D. *Tilapia* sp
 - Seed plants are divided into A. angiosperms and gymnosperms B. monocotyledons and dicotyledons C. thallophytes and bryophytes D. tracheophytes and ferns.
 - In which of the following groups of vertebrates is parental care mostly exhibited? A. Amphibia B. Ayes. C. Mammalia D. Reptilia.
- Use the diagrams below to answer questions 6 to 8



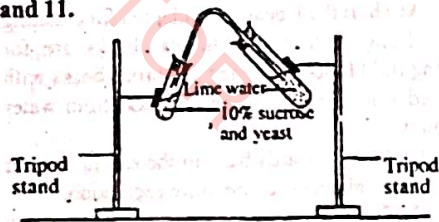
6. Which of the organisms represented are notable agricultural pests? A. I and IV B. II and III C. I and III D. II and IV

7. An economic importance of the organism represented by IV is that A. it is destructive to farm crops B. its faeces pollutes drinking water C. it helps in the control of mosquito larvae D. it transmits water-borne diseases to humans.

8. The adult form of III is a vector of A. river blindness B. cholera C. elephantiasis D. sleeping sickness

9. The adaptive importance of nuptial flight from termite colonies is to A. provide abundant food for birds and other animals during the early rains B. ensure cross-breeding between members of one colony and another C. expel the reproductive so as to provide enough food for other members D. disperse the reproductive's in order to establish new colonies

Use the diagram below to answer question 10 and 11.



10. The gas evolved in the process is A. nitrogen B. oxygen C. carbon (II) oxide D. carbon (IV) oxide

11. The experimental set-up above is used to demonstrate the process of A. photosynthesis B. fermentation C. plasmolysis D. diffusion

12. Which of the following can cause shrinkage of living cells? A. Isotonic solution. B. Deionized water C. Hypertonic solution. D. Hypotonic solution.

13. Which of the following is true of leucocytes? A. They are most numerous and ramify all cells B. They are large and nucleated C. They are involved in blood clotting D. They are respiratory pigments.

14. The conversion of a nutrient into a molecule in the body of a consumer is referred to as A. assimilation B. absorption C. inhibition D. digestion.

15. The ability of a living organism to detect and respond to changes in the environment is referred to as A. irritability B. growth C. taxis D. locomotion.

16. In mammals, the exchange of nutrients and metabolic products occurs in the A. oesophagus B. trachea C. lymph D. lungs.

17. An example of an endospermous seed is A. cashew nut B. cotton seed C. bean seed D. maize grain

18. I. Parasitism → Sundew, II. Autotrophism → Amoeba, III. Saprophytism → Alga, IV. Heterotrophism → Agama. Which of the above modes of nutrition is correctly matched with the organism that exhibits it? A. III B. IV C. I, D. II

Use the information below to answer questions 19 and 20.

I. Test tube containing cane sugar and water
II. Test tube containing cane sugar and dilute acid
III. Test tube containing cane sugar and its degrading enzyme

19. In which of the test tubes will glucose be detected after complete hydrolysis? A. II and III only. B. I only. C. I, II and III. D. I and II only.

20. The enzyme involved in the hydrolysis is A. erepsin B. sucrase C. maltase D. rennin

21. The part of the mammalian ear responsible for the maintenance of balance is the A. pinna B. perilymph C. ossicles D. cochlea.

22. The path followed by air as it passes through them lungs in mammals is A. bronchi → trachea → alveoli → bronchioles B. trachea → bronchioles → bronchi → alveoli C. bronchioles → alveoli → bronchi → trachea D. trachea → bronchi → bronchioles → alveoli.

23. The movement response of a cockroach away from a light source can be described as A. negative phototaxis B. negative phototropism C. positive phototropism D. positive phototaxis.

24. The vascular tissues in higher plants are responsible for A. suction pressure B. transpiration pull C. the transport of gases and water D. the movement of food and water.

25. Which of the following organs regulates the level of water, salts, hydrogen ions and urea in the mammalian blood? A. Kidney. B. Bladder. C. Colon. D. Liver.

26. The sequence of the one-way gaseous exchange mechanism in a fish is A. gills → operculum → mouth B. mouth → operculum → gills C. mouth → gills → operculum D. operculum → gills → mouth.

27. The type of asexual reproduction that is common to both Paramecium and protists is A. sporulation B. fragmentation C. fission D. budding.

28. In nature, plants and animals are perpetually engaged in mutualism because A. all animals rely on food produced by plants B. they utilize respiratory wastes of each other C. they are neighbours D. they are rivals.

29. In an experiment to determine the percentage of humus and water in a soil sample, the following results were obtained: Weight of the evaporating basin alone = 80.5g, Weight of basin and soil = 101.5g, Weight after drying the soil in the oven 99.0g, Weight of basin and roasted soil = 95.5g. The percentage of humus in the soil sample is A. 17.6% B. 26.7% C. 16.2% D. 16.7%

30. An example of a filter-feeding animal is A. butterfly B. whale C. mosquito D. shark

31. Which of the following is a feature of the population pyramid of a developing country? A. Low birth rate. B. Low death rate C. Short lifespan. D. Long lifespan.

32. The interaction of a community of organisms with its abiotic environment constitutes A. a food chain B. an ecosystem C. a microhabitat D. a niche.

33. The vector of the malaria parasite is a A. female Anopheles mosquito B. male Culex mosquito C. female Culex mosquito D. female Aedes mosquito.

34. Which of the following instruments is used to measure relative humidity? A. Thermometer B. Hygrometer C. Anemometer D. Anemometer

35. Exo-erythrocytic phase of the life cycle of malaria parasite occurs in the A. reticuloendothelial cells of humans B. Malpighian tubules of mosquito C. brain of humans - D. liver of humans.

36. Habitats are generally classified into A. aquatic and terrestrial B. aboreal and marine biomes C. microhabitats and macrohabitats D. biotic and abiotic.

37. Dracunculiasis can be contracted through A. drinking contaminated water B. bathing in contaminated water C. bites of blackfly D. eating contaminated food.

38. Which of the following groups of environmental factors are density dependent? A. Temperature, salinity, predation and disease. B. Food, predation, disease and accumulation of

metabolites. C. Temperature, food, disease and light. D. Food, salinity, accumulation of metabolites and light.

39. Millet, sorghum, maize and onions are common crops grown in Nigeria in the A. Sudan savanna B. Anontane forests C. Sahel savanna D. tropical rainforests.

40. In which of the following biomes is the south western part of Nigeria located? A. Tropical rainforest. B. Tropical Wood land. C. Desert. D. Temperate forest.

41. Lack of space in a population could lead to an increase in A. birth rate B. disease rate C. drought D. water scarcity.

42. The inheritable characters that are determined by a gene located only on the X-chromosome is A. sex-linked B. homozygous C. dominant D. recessive.

43. If the cross of a red-flowered plant with a white-flowered plant produces a pink-flowered plant, it is an example of A. incomplete dominance B. mutation C. linkage D. Codominance.

44. Which of the following theories was NOT considered by Darwin in his evolutionary theory? A. Survival of the fittest. B. Use and disuse C. Competition. D. Variation.

45. The crossing of individuals of the same species with different genetic characters is A. polygenic inheritance B. non-disjunction C. inbreeding D. cross breeding.

46. The number of alleles controlling blood groups in humans is A. 4 B. 5 C. 2 D. 3

47. During blood transfusion, agglutination may occur as a result of the reaction between A. two different antigens B. two different antibodies C. similar antigens and antibodies D. contrasting antigens and antibodies.

48. The fallacy in Lamarck's evolutionary theory was the assumption that A. acquired traits are heritable B. acquired traits are seldom formed C. traits are acquired through the use of body parts D. traits are acquired through disuse of body parts.

49. The brightly coloured eye spots on the hind wings of a moth are an example of A. disruptive colouration B. crypsis C. mimicry D. warning colouration.

50. The wings of a bat and those of a bird are examples of A. coevolution B. continuous variation C. divergent evolution D. convergent evolution.

U. T. E. M BIOLOGY 2011 SOLUTION QUESTIONS PAPER TYPE: B

1. B: This is type B Biology question paper.

2. B: The display of red head by Agama lizards is a courtship signal. It is to attract female lizards for mating purposes.

3. C: The biomass of an organism is the total amount of living tissues present in such organism. Of the species given, Spirogyra has the smallest biomass. Note well that biomass is not the same as pyramid of biomass which is employed in a food chain.

4. A: Seed plants are divided into angiosperms and gymnosperms. Angiosperms are further divided into monocotyledons and dicotyledons.

5. C: Of the five classes in sub-phylum vertebrata (Pisces, Amphibians, Reptiles, Aves and Mammals), class Mammalia shows the greatest parental care. Classes Aves and Pisces also show parental care to some extent while organisms in classes Amphibian and Reptilia do not show any parental care.

6. A: "I" represents Grasshopper, "II" represents the young form (nymph) of cockroach, "III" represents Mosquito larva while "IV" represent Butterfly larva (known as caterpillar). Caterpillars are notorious agricultural pests while some species of Grasshopper are also pests.

7. A: As said earlier, "IV" represents caterpillar which is an agricultural pest i.e. it is destructive to farm crops.

8. D: "III" as said earlier, is a mosquito larva. Some mosquitoes are vectors of *Wuchereria bancrofti*, which is the major causative organism of **Elephantiasis** (Sleeping sickness).

9. D: The adaptive importance of nuptial flight from termite colonies is to disperse the reproductives in order to establish new colonies.

10. D: The fermentation of sugar yields ethanol and carbon (IV) oxide. Thus, the gas evolved is CO_2 . The milky appearance of the lime water lends more credence to this claim.

11. B: As explained earlier, the experiment is to demonstrate fermentation.

12. C: When a cell is placed in a **hypotonic** solution, it absorbs water, become **turgid** and may eventually burst. When a cell is placed in a hypertonic solution, it loses water and consequently shrink.

13. B:

- Leucocytes (white blood cells) are fewer in number than erythrocytes (red blood cells).
- They are large and nucleated unlike erythrocytes that are small and anucleated.
- Leucocytes are **not** involved in blood clotting. Only thrombocytes (blood platelets) are involved in blood clotting.
- They are not respiratory pigments.

14. D: The process by which food is broken down into simple, soluble and absorbable form is called **digestion**.

15. A: Irritability is the ability of an organism to detect and respond to changes in its environment.

16. C: Lymph vessels are generally known for returning excess fluid to the circulation. Apart from this, they also lie near the cells that line the intestines, absorbing fats and fat soluble vitamins which are then transported to the blood.

17. D: All angiosperms show double fertilization. This double fertilization produces the primary endosperm and the zygote. In many plants, the embryo absorb the nutritive endosperm (produced from the primary endosperm). In some plants such as **maize** and castor plant, the nutritive endosperm persists in the seed as food storage tissue.

18. B: Sundew (a carnivorous plant) should not be totally accused of parasitism as it does photosynthesize as well. It only trap insects to obtain nitrogen. Amoeba is heterotrophic, algae is autotrophic while Agama is heterotrophic.

19. A: Cane sugar contains sucrose, which is a disaccharide. Addition of dilute acid or enzyme causes it to be hydrolyzed into the monosaccharides (glucose and fructose) Addition of ordinary water (as in test tube I) does not effect the hydrolysis.

20. B: The enzyme involved in the hydrolysis is sucrose. But wait! Couldn't you have guessed right? You can! Since it has been said that cane sugar contains **sucrose**, it can be easily deduced that the enzyme that will be involved is **sucrase**. If it is **maltose**, the enzyme will be **maltase**. So if it is lactose, what will the enzyme be? Lactase! Good!!!

21. B: The structures concerned with the maintenance of balance are the semi-circular

canals, utricle and saccule. These structures are formed from the passage way filled with perilymph. Thus, perilymph can be said to be associated with the maintenance of balance.

22. D: Air travels from the trachea to the bronchi, and then to the bronchioles and finally to the alveoli. Trachea \rightarrow bronchi \rightarrow bronchioles \rightarrow alveoli

23. A: The movement of a whole organism in response to a stimulus of light is known as **phototaxis**. The movement **towards** the direction of light is known as **positive phototaxis**. The movement away from the direction of light is known as **negative phototaxis**. Tropism, on the other hand, deals with the movement of a **plant part** in response to a directional stimulus.

24. D: The vascular tissues in plants are responsible for the movement of food and water. Xylem tissues are responsible for the transport of water and mineral salts while phloem tissues are for food.

25. A: The kidneys regulate the levels of water, salts, urea and hydrogen ions through a process known as selective reabsorption

26. C: The fish first closes the operculum and opens the mouth. Water rushes into the gill chamber and move across the gill filament. Here, the oxygen in the water is absorbed and CO_2 passed into the water. The operculum is then opened and water containing CO_2 is released to the exterior. Thus, the correct sequence is: mouth \rightarrow gills \rightarrow operculum

27. C: The type of asexual reproduction that is common to both paramecium and protists is **fission**

28. A - Plants and animals enjoy mutualistic association. Animals depend on plants for their food. When animals die and are broken down by decomposers, their remains are for plants' use.

29. D: Weight of basin alone = 80.5g
Weight of basin and soil = 101.5g
Thus, weight of soil = $(101.5 - 80.5)\text{g} = 21\text{g}$
Weight after drying the soil in the oven = 99.0g
Weight of basin and roasted soil = 95.5g
Since roasting the soil will burn away the humus content, mass of humus = $99.0\text{g} - 95.5\text{g} = 3.5\text{g}$
Percentage of humus in the soil $\frac{3.5\text{g}}{21\text{g}} \times 100\% = 16.67\%$

30. B: Filter feeders are organisms feeding on small pieces of food or small organisms. Examples are flamingoes, oysters, mosquito larvae and whale. Does it seem two correct options are supplied? No! Read again, I wrote mosquito larvae not mosquito. Mosquitoes are not filter feeders while mosquito larvae are.

31. C: Developing countries are characterized by high birth and death rates. The lifespan is usually short.

32. B: An ecosystem refers to a community of living organisms interacting with their non-living (abiotic) environment

33. A: The causative agent of malaria is *Plasmodium falciparum*. The vector is **female Anopheles mosquito**.

34. B: The **relative humidity** is measured with the aid of an instrument known as the **hygrometer**. NB: Do not confuse the **hygrometer** with the **hydrometer**, which is an instrument for measuring **relative density**.

35. D: The exo-erythrocytic phase of the life cycle of plasmodium occurs in the liver while the erythrocytic phase occurs in the red blood cells.

36. A: The two major classes of the habitat are **aquatic habitat** and **terrestrial habitat**.

37. A: Dracunculiasis, which is caused by *Dracunculus medinensis*, can be contracted by drinking contaminated water. The water flea (*Cyclops spp*) is the vector of the much dreaded dracunculiasis

38. B: Food, disease, predation and accumulation of metabolites depend on density. Density dependent factors are those factors that depend on population size.

39. A: The Sudan savanna supports crops like sorghum, pearl, millet, rice, onions, maize etc.

40. A: The south western part of Nigeria is located in the tropical rainforest.

41. B: Lack of space in a population causes overcrowding which in turn causes an increase in disease rate.

42. A: Sex-linked characters are determined by genes located on X-chromosomes. Examples are haemophilia, colour blindness, sickle cell anaemia, albinism and baldness.

43. A: Incomplete dominance occurs when the interaction of two homozygous phenotypes produces a heterozygous phenotype that is different from the homozygous phenotypes.

44. B: The theory of use and disuse was propounded by Jean Baptiste Lamarck.

45. C:

- **Polygenic inheritance** is when inherited characters are not controlled by one gene, but rather by the combined effect of many genes.
- **Non-disjunction** is a situation where by homologous chromosomes fail to separated during genetic formation, causing the zygote to either be monosomic or trisomic
- **In-breeding** is the crossing of individuals of the same species with different genetic characters.

46. D: Three alleles (A, B or O) control the blood type. A person's blood types is due to the inheritance of one of them.

47. D:

- Blood group A has antigen - A and antibody - B
- Blood group B has antigen - B and antibody - A
- Blood group AB has antigens - A and B and no antibody
- Blood group O has no antigen but has antibodies A and B

Blood samples with contrasting antigens and antibodies will agglutinate if mixed together.

48. A: Jean Baptiste Lamarck made a ground-breaking submission in his theory of use and disuse. From him, we learnt that organs that are constantly used become more developed while those not frequently used become atrophied. However, he flopped when he submitted that acquired characters are heritable. Never!!! If it were to be true, a person with one leg amputated (due to an accident or a disease) would give birth to a child with one leg.

49. D: The brightly coloured eye spots on the hind wings of moth are examples of warning colouration. They scare away potential predators. This is an example of protective colourations.

50. D: Convergent evolution is said to have occurred when two or more unrelated species look alike.

U.M.E BIOLOGY 2010
Question Paper Type: C

1. Which Biology Question Paper Type is given to you? A. Type A B. Type B C. Type C D. Type D

2. Which of the following characterizes a mature plant cell? A. The cytoplasm fills up the entire cell space B. The nucleus is pushed to the centre of the cell C. The cell wall is made up of cellulose D. The nucleus is small and irregular in shape.

3. Which of the following is NOT a function of the nucleus of a cell? A. It controls the life processes of the cell. B. It translates genetic information for the manufacture of proteins. C. It stores and carries hereditary information. D. It is a reservoir of energy for the cell.

4. The dominant phase in the life cycle of a fern is the A. gametophyte B. prothallus C. sporophyte D. antheridium.

5. Parental care is exhibited by A. toads B. snails C. earthworms D. birds.

Use the diagram below to answer questions 6 and 7.



6. With respect to their decreasing dependence on aquatic conditions for reproduction, which of the following is the correct arrangement of the animals represented? A. I, IV, II and III B. IV, III, II and I C. I, II, IV and III D. III, II, IV and I

7. Which of the animals represents the oldest creatures in terms of evolutionary history? A. III B. II C. I D. IV

8. Which of the following groups of cells is devoid of true nuclei? A. Viruses. B. Algae. C. Monera D. Fungi.

Use the diagram below to answer Questions 9 and 10.



9. The main function of the feathers covering the part labeled I is to A. prevent ectoparasites from attacking the animal B. generate heat to keep the animal warm C. provide some power for flight D. serve as insulator to maintain body heat.

10. Based on the shape and structure of the beak and feet, the bird represented is likely to feed mainly on A. flesh B. fruits C. seeds D. nectar.

11. Which of the following is true of the transverse section of a dicot stem? A. The epidermis is completely encircled by the cortex. B. The xylem is more interiorly located than the phloem. C. The cambium lies between the cortex and the vascular bundles. D. The vascular bundles are randomly scattered within the cortex.

Use the diagram below to answer questions 12 and 13.



12. The movement of material in the xylem and phloem tissues of the plant are represented by the

arrows labeled A. III and IV respectively B. II and I respectively C. VI and II respectively D. IV and III respectively.

13. During photosynthesis, the arrow labeled II represents the A. escape of mineral salts B. absorption of energy from the sun C. release of carbon (IV) oxide D. release of oxygen as a by-product.

14. Which of the following is lacking in the diet of a person with kwashiorkor? A. Vitamins. B. Proteins. C. Carbohydrates D. Minerals.

15. The mode of nutrition of sundew and bladderwort can be described as A. autotrophic B. saprophytic C. holozoic D. chemosynthetic.

16. When a mixture of a food substance and Benedict's solution was warmed, the solution changed from blue to brick-red. This indicates the presence of A. reducing sugar B. fatty acid C. sucrose D. amino acid.

17. The primary structure responsible for pumping blood for circulation through the mammalian circulatory systems is the A. veins B. right auricle C. arteries D. left ventricle.

18. Circulation of blood to all parts of the body except the lungs is through A. the pulmonary artery B. systemic circulation C. the lymphatic system D. pulmonary circulation.

19. Yeast respire anaerobically to convert simple sugar to carbon(IV) oxide and A. alcohol B. acid C. oxygen D. water.

20. The sheet of muscle that separates the thoracic and the abdominal cavities is the A. diaphragm B. intercostal muscle C. pleural membrane D. pericardium.

21. The oily substance that lubricates the mammalian hair to keep it flexible and water repellent is secreted by the A. sweat glands B. sebaceous glands C. fatty cells D. granular layer.

22. The outer layer of the kidney where the Bowman's capsules are found is the A. cortex B. pelvis C. medulla D. pyramid.

23. Which of the following stimuli is likely to elicit a nastic response in an organism? A. Touch. B. Light intensity C. Chemical substances. D. Gravity.

24. In the male reproductive system of a mammal, sperm is stored in the A. vas deferens B. urethra C. epididymis D. seminiferous tubules.

25. Chemosynthetic organisms are capable of manufacturing their food from simple inorganic substances through the process of A. oxidation B. denitrification C. reduction D. phosphorylation

26. The part of the human gut that has an acidic content is the A. stomach B. duodenum C. ileum D. colon.

27. I. Stomata → Spirogyra, II. Alveoli → Earthworm, III. Malpighian tubule → Mammal, IV. Contractile vacuole → Protozoa. Which of the above structures is correctly matched with the organisms in which it is found? A. III B. II C. I D. IV

28. A food chain always begins with a A. consumer B. decomposer C. producer D. primary consumer.

29. Mycorrhizae promote plant growth by A. absorbing inorganic ions from the soil. B. protecting it from infection C. helping it to utilize atmospheric nitrogen. D. serving as a growth regulator

30. The barrier between maternal and foetal blood is the A. placenta B. liver C. umbilical chord D. uterine wall.

31. The blood component that has the greatest affinity for oxygen is the A. lymphocytes B. leucocytes C. erythrocytes D. thrombocytes.

32. Which of the following organisms is mainly found in the marine habitat? A. Achatina B. Tilapia. C. Dogfish D. Tortoise.

33. The two halves of the pelvic girdle are joined together at the A. pubic symphysis B. ilium C. pubis D. obturator foramen.

34. I. Adoption of appropriate nocturnal habits, II. Burrowing, III. Adjusting their internal body temperature IV. Possession of many sweat pores. Which of the above are ways in which desert animals adapt to extreme heat of environment? A. I and IV only. B. II and III only. C. I and II only. D. I, II and III only.

35. Low annual rainfall, sparse vegetation, high diurnal temperatures and cold nights are characteristic features of the A. tropical rainforest B. desert C. montane forest D. guinea savanna.

36. The average number of individuals of a species per unit area of the habitat is the A. population density B. population frequency C. population size D. population distribution

37. The activity of an organism which affects the survival of another organism in the same habitat constitutes A. an edaphic factor B. an abiotic factor C. a biotic factor D. a physiographic factor.

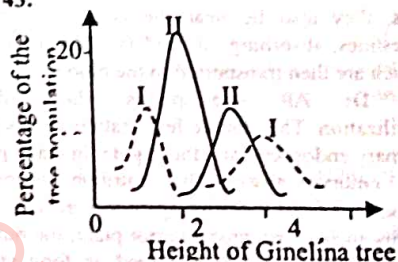
38. The loss of soil through erosion can be reduced by A. watering B. crop rotation C. manuring D. irrigation.

39. The vector for yellow fever is A. edes mosquito B. Anopheles mosquito C. tsetse fly D. blackfly.

40. The protozoan Plasmodium falciparum is transmitted by A. female Anopheles mosquitoes B. female Aedes mosquitoes C. female Culex mosquitoes D. female blackfly.

41. A dilute solution of phenylthiocarbamide tastes bitter to some people and is tasteless to others. This is an example of A. taste bud variation B. discontinuous variation C. morphological variation D. continuous variation.

Use the diagram below to answer questions 42 and 43.



42. In which plantation are all the trees between the height of 2-4m? A. III B. II C. I D. IV

43. Which of the following is a true feature of plantation II? A. It has the highest number of trees of about 2m high B. It has the highest number of tall trees D. The height of all its trees range between 2m and 6m.

44. Thyroxine and adrenalin are examples of hormones which control A. blood grouping B. tongue rolling C. behavioural patterns D. colour variation.

45. A pair of genes that control a trait is referred to as A. an allele B. recessive C. dominant D. a hybrid.

46. The chromosome number of a cell before and after the process of meiosis is conventionally represented as A. $2n \rightarrow 2n$ B. $n \rightarrow n$ C. $n \rightarrow 2n$ D. $2n \rightarrow n$

47. If both parents are heterozygous for a trait, the probability that an offspring will be recessive for that trait is A. $\frac{3}{4}$ B. $\frac{1}{2}$ C. $\frac{1}{4}$ D. 1
48. At what stage in the life history of a mammal is the sex of an individual set? A. At adolescence. B. At puberty. C. At birth D. At conception.
49. The main distinguishing features between the soldier termite and other members of the caste are the A. presence of wings, possession of a small head and large thorax B. presence of wings, possession of a large thorax and a small head C. absence of wings, possession of strong mandibles and a large head D. absence of wings, possession of big head and the absence of mandible.
50. The flippers of a whale and the fins of a fish are examples of A. divergent evolution B. coevolution C. continuous variation D. convergent evolution

U.M.E BIOLOGY 2010 SOLUTION

Question Paper Type: C

1. C: This is type C Biology Question Paper Type.
2. C: Unlike in animal cells where the nucleus is centrally placed, the mature plant cell has its nucleus at the edge of the cell. This is because the volume gets enlarged and more centrally placed as the cell matures. Hence, the nucleus is pushed to the edge of the cell and not the centre as suggested by option B. The cell wall of a plant is always made of cellulose.
3. D:
- The nucleus controls the life processes of a cell.
 - It translates genetic formation for the manufacture of proteins.
 - It stores and hereditary information.
 - It DOES NOT serve as a reservation of energy such role belongs to the MITOCHONDRION.
4. C: The gametophyte is the dominant phase in the life cycle of bryophytes (e.g. mosses) while the sporophyte is the dominant phase in the life cycle of pteridophytes (e.g. ferns).
5. D: When we talk of animals that show parental care to their young ones, the first class that comes to one's mind is class mammalia. Although they show the greatest parental care, it is not peculiar to them: Fishes and birds also exhibit parental care to some extent.
6. B: Fishes live and reproduce in water; amphibians live on land but go back to the water for reproduction; majority of reptiles are totally terrestrial, however the one given by "II" (crocodile) is aquatic. Thus, the correct sequence is IV, III, II, I
7. D: The first vertebrates to evolve are the pisces, followed by the amphibians, followed by the reptiles, followed by the birds and finally the mammals.
8. C: The Monorans (organisms in Kingdom Prokaryotae) are devoid of true nuclei - their nuclear materials are scattered within the cytoplasm.
9. D: It serves as insulator to maintain body heat.
10. A: From how the beak and feet are shaped, the bird is clearly carnivorous.
11. B: The xylem of a dicot stem is more interiorly situated than the phloem.
12. D: The xylem transports water and mineral salts from the soil up the plant while the phloem

transports manufactured food from the leaves to other parts of the plant.

13. D: During photosynthesis, oxygen is released as a by-product; arrow "II" depicts this.
- $$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$$

14. B: A kwashiorkor patient is protein deficient.

15. C: In holozoic nutrient, organisms feed directly on food synthesized by green plants. Carnivorous, herbivorous and omnivorous feeders are all holozoic. Sundew and bladderwort are carnivorous plants.

16. A: When Benedict's solution is warmed with a reducing sugar, a brick-red precipitate is obtained. Examples of reducing sugars are glucose, galactose, fructose, mannose, maltose and lactose. Example of non-reducing sugars are sucrose, starch, cellulose and inulin.

17. D: The blood is pumped from the left ventricle (through the largest artery - the aorta) into the circulatory system.

18. B: The circulation of blood to all parts of the body except the lungs is known as the systemic circulation while the circulation of blood to the lungs constitutes the pulmonary circulation.

19. A: The anaerobic respiration of yeast converts simple sugar to carbon (iv) oxide and ethanol. $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2 + \text{Energy}$

20. A: The sheet of muscle that separates the thoracic cavity from the abdominal cavity is known as the diaphragm.

21. B: Sebum is the oily substance that lubricates the skin and the mammalian hair. Sebum is secreted by the sebaceous gland.

22. A: The outer layer of the kidney is known as the cortex while the inner layer is known as the medulla.

23. B: Nastic movement is a type of response to non-directional stimuli such as humidity and light intensity.

24. C: Sperms are produced in the seminiferous tubule; temporarily stored in the epididymis.

25. A: Chemosynthesis is a form of nutrition in which organisms synthesize organic compounds from simple inorganic materials such as ammonia, water, CO_2 . The energy required for the synthesis is obtained by the oxidation of the inorganic substances.

26. A: The human stomach has glands which secrete hydrochloric acid. The HCl has a lot of functions, among which are:

- It neutralizes the alkalinity of the saliva.
- It serves as the appropriate medium for pepsin to act.

27. D: The contractile vacuole is used by protozoans for removing excess water.

28. C: A food chain always begins with a producer, followed by the consumers.

29. A: There is a relationship between fungi and plant; it is known as mycorrhiza. The relationship is mutualistic. The plant provides food for the fungi while the hyphae of the fungi helps the plant in absorbing water and minerals.

30. A: The barrier between maternal and foetal blood is the placenta. The placenta prevents the maternal blood from mixing with the foetal blood.

31. C: The erythrocytes transport oxygen round the body. The leucocytes perform protective functions while thrombocytes are responsible for blood clotting.

32. C: Dogfish is mainly marine. Tilapia can be found in both marine and fresh water habitat.

33. A: The two halves of the pelvic girdle are joined together at the pubic symphysis.

34. C: The following are the adaptive features of desert animals:

(i) They can withstand a high degree of fluid loss.

(ii) Some of them have thick covering to prevent water loss e.g. some reptiles and insects.

(iii) During the day, they usually hide in burrows.

(iv) Most of them are nocturnal.

35. B: Hot days and cold nights, low rainfall and sparse vegetation: These are the features of a desert.

36. A: The population density is the number of individuals per unit area. It is measured in per squared metres.
$$\text{Population density} = \frac{\text{Total Area (m}^2\text{)}}{\text{Number of Individual}}$$

37. C: Biotic factors affecting an organism are the living factors while the non-living factors are called abiotic factors.

38. B: Crop rotation is one of the natural ways of reducing soil erosion.

39. A: The aedes mosquito is the vector of yellow fever. The tsetse fly is the vector of trypanosome spp, which causes sleeping sickness.

40. B: Plasmodium falciparum, the causative agent of malaria is transmitted by the female Anopheles mosquitoes.

41. B: Since you are either able to taste PTC or not (i.e. no intermediate), the variation is said to be discontinuous.

42. A: The graph "III" falls between 2m and 4m, this means that all the trees in that plantation are between (2-4)m.

43. A: Plantation "II" has the highest number of trees of about 2m high (about 20%).

44. C: Thyroxine and adrenalin are examples of hormones that control behavioural patterns. In fact, adrenalin (the fight and flight hormone) mainly dictates how an individual act in time of emergency.

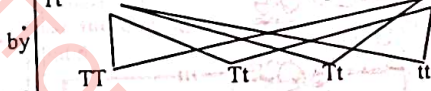
45. C: The gene that controls a trait is the gene that is dominant. When there are two dissimilar genes for a particular trait, the one that is expressed is known as the dominant gene while the one that is suppressed is known as the recessive gene.

46. D: Meiosis always halves the chromosome number i.e. it produces haploid d(n) daughter cell from diploid (2n) cell.

$$2n \rightarrow n$$

(diploid) (haploid)

47. C: Let each parent be Tt



- 1 : 2 : 1
- One is homozygously tall
 - Two are heterozygously tall
 - One is short phenotypically i.e. it picks the two recessive genes.

48. D: The sex of an individual is determined at conception.

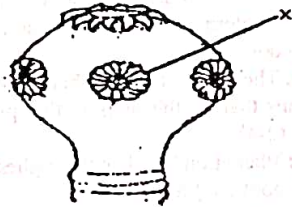
49. C: You should be able to tell what the correct option is. Since the role of the soldier termites is to defend the colony, the mandibles with which they do this must be strong.

50. Convergent evolution is said to have occurred when species that look similar are from different ancestral species. The flipper of a whale and the fins of a fish make them look similar; however whale is a mammal, not a fish.

U.M.E JAMB BIOLOGY 2009

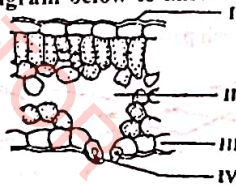
1. What is the level of organization of an onion bulb? A. Tissue. B. Organ C. Systemic. D. Organism.
2. A characteristic exhibited by all living organisms is A. sexual reproduction B. aerobic respiration C. the ability to move from one place to another D. the ability to remove unwanted substances.
3. In a cell, the genes are carried by A. nuclear membranes B. chromatin threads C. lysosomes D. mitochondria.
4. Alternation of asexual and sexual modes of reproduction is found in A. blue-green algae B. *Euglena* C. fern D. maize.
5. The first terrestrial vertebrates evolved from A. Pisces B. Reptilia C. Amphibia D. Mammalia.
6. In plants, the structures that play roles similar to the arteries and veins of animals are the A. xylem and phloem B. root hairs and xylem. C. lenticels and phloem D. roots and stems.
7. A blue-green alga is not a protophyte because A. it is aquatic B. its cells are prokaryotic C. it cannot move D. it is not a green plant.

Use the diagram below to answer questions 8 and 9.



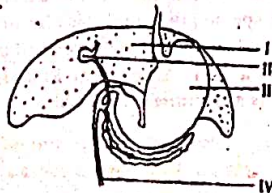
8. The structure labeled X is for A. attachment B. feeding C. seeing D. breathing.
9. The habitat of the organism is A. slow moving streams and marshes B. the stomach of large mammals C. under leaf litter on forest floor D. the small intestine of large vertebrates.
10. The feature that makes locomotion in water easy for fish is the A. scaly body B. slimy body C. stream lined body D. lateral line
11. Bird toes suitable for digging have claws that are A. blunt B. curved C. hooked D. sharp.
12. Chewing the cud is an adaptation peculiar to A. herbivores B. omnivores C. rodents D. ruminants.

Use the diagram below to answer questions 13 and 14.



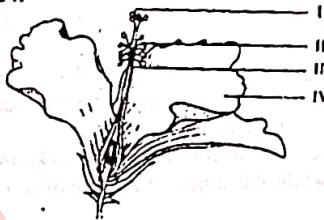
13. The structure that controls loss of water vapour during transpiration is labeled A. I B. II C. III D. IV
14. The part labeled I is the A. spongy mesophyll B. upper epidermis C. cuticle D. vein
15. Which of the following is an example of a carnivorous plant? A. Hydra B. Bladderwort C. Yeast D. Spirogyra

Use the diagram below to answer questions 16 and 17.



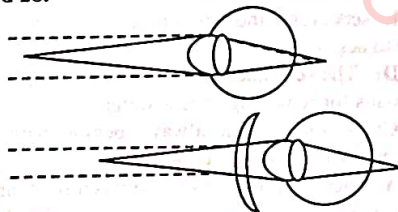
16. Emulsification of fats takes place in the part labeled A. I B. II C. III D. IV
17. The content of the part labeled III is usually A. neutral B. alkaline C. acidic D. saline.
18. The part of the alimentary system of a bird where food is ground into small particles is the A. cloaca B. stomach C. crop D. gizzard
19. Which of the following describes the sequence of blood flow from the heart to a tissue? A. Heart → artery → arteriole → tissue B. Heart → vein → venule → tissue C. Heart → venule → vein → tissue D. Heart → arteriole → artery → tissue.
20. The enzymes of the glycolytic pathway are located in the A. mitochondria B. gastric juice C. plasma D. cytoplasm
21. In insects, the structure that performs the same function as the kidney in man is the A. nephridium B. flame cell C. Malpighian tubule D. trachea
22. The axial skeleton is found in the A. skull, ribs, vertebral column and breast bone B. skull humerus, vertebral column and ribs C. breastbone, clavicle, ribs and vertebral column D. femur, sternum, ulna and skull

Use the diagram below to answer questions 23 and 24.



23. The male sex cells are contained in the part labeled A. I B. II C. III D. IV
24. The likely pollinating agent of the flower is A. wind B. water C. insect D. man
25. The reproductive system of a male mammal is made up of A. claspers, prostate gland, sperm duct and vas deferens B. testis, prostate gland, sperm duct and vas deferens C. oviduct, urethra, testis and sperm duct D. testis, uterus, prostate gland and sperm duct.
26. In a bean seed, absorption of water at the germination is through the A. hilum B. micropyle C. testa D. plumule.

Use the diagram below to answer questions 27 and 28.

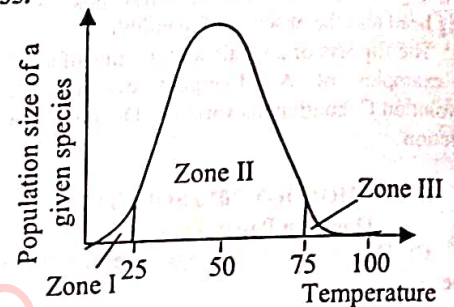


27. The eye defect illustrated is A. myopia B. hypermetropia C. astigmatism D. cataract.
28. The function of the correcting lens is to A. diverge incoming rays B. converge incoming rays C. reflect incoming rays D. screen incoming rays.
29. The most important ecological factor in a terrestrial environment is A. rainfall B. humidity C. wind D. soil.
30. The association between bacteria residing in the caecum and the ruminant is A. parasitism B. predation C. saprophytism D. mutualism.
31. A marine protozoan is likely to have no contractile vacuole mainly because the cytoplasm is A. isotonic to seawater B. hypotonic to sea water C. hypertonic to sea water. D. impervious to seawater.

32. In freshwater marshes and swamps, the most important abiotic factor that organisms have to A. nature of substratum B. high salinity C. high temperature D. low pH

33. Which of the following biomass could be characterized by very low rainfall, cold nights, hot days and fast blooming plants? A. Northern Guinea savanna B. Southern Guinea savanna C. Tropical desert D. Montane forest

Use the graph below to answer questions 34 and 35.



34. The zone of physiological stress is represented by A. I and II B. II only C. II and III D. I and III.
35. The optimum temperature for the growth of the organism is A. 25°C B. 50°C C. 75°C D. 100°C
36. Mass of crucible = 10g, Mass of crucible and soil before heating = 29g, Mass of a crucible and soil after heating = 18g. From the information above, determine the percentage of water in the given soil sample? A. 20% B. 25% C. 10% D. 50%
37. Which of the diseases listed above are associated with water? A. I and II only B. II, III and IV C. I, II and III D. II and IV
38. The major cause of global warming is the A. burning of fossil fuel B. construction of dams C. use of electricity D. exploration of space
39. The uniqueness of an individual organism in a population is accounted for by A. evolution B. variation C. adaptation D. mutation
40. A phenotypic character with intermediate forms that can be graded from one extreme to the other is referred to as A. discontinuous variation B. continuous variation C. amutant D. agenome
41. A farmer's assumption that the seed from a good harvest will produce a good yield is explained by the theory of A. evolution B. adaptation C. variation D. heredity.
42. In Mendelian inheritance, discontinuous characters are controlled by the A. centromeres B. alleles C. chromosomes D. chromatids.
43. A woman with the ability to roll her tongue (Tt) marries a man who cannot roll his tongue (tt). What is the probability of each of their children being a tongue roller? A. 100% B. 75% C. 50% D. 25%
44. A health condition that gene mutation is A. haemophilia B. colour blindness C. sickle-cell D. anaemia
45. Plants that grow in an area that is neither too wet nor too dry are A. xerophytes B. mesophytes C. epiphytes D. hydrophytes
46. The part of a domestic fowl responsible for preventing heat loss is the A. filoplume B. contour feather C. down feather D. quill.
47. Which of the following animals is most adapted for water conservation? A. Earthworms B. Mammals C. Flatworms D. Insects.
48. The specialized pigment cells that are involved in colouration and colour change in

animals are the A. xanthophyll B. chromatophores C. chlorophyll D. melanin.

49. During the dry season in the tropics, the body metabolism of some animals slows to a minimal level in a process referred to as A. hibernation B. aestivation C. dormancy D. senescence.

50. According to Darwin, the driving force behind evolutionary change is A. natural selection B. genetic drift C. mutation D. gene flow.

U.M.E BIOLOGY 2009 SOLUTION

1. A: An onion bulb is aptly described as a tissue.

2. D: The ability to remove unwanted substances from the body is common to all living organism.

3. B: The genes are always located on the chromosomes. Chromatin threads are tiny forms of chromosomes (yet to condense).

4. C: Alternation of sexual and asexual mode of nutrition is commonly exhibited by bryophytes (e.g. mosses) and pteridophytes (e.g. ferns) – Remember these two divisions clearly show alternation of generation.

5. C: The first terrestrial vertebrates are the reptiles. Since reptiles succeed amphibians in the evolutionary trend, it is then correct to say that the first terrestrial vertebrates are from the amphibians.

6. A: Just the same way arteries and veins transport materials round the body of an animal, phloem and xylem also transport substances in plants.

7. B: Blue-green algae belong to kingdom prokaryotae while protophytes are eukaryotes. This is why a blue-green alga cannot be classified as a protophyte.

8. A: The diagram given represents the head of a tape worm (scolex). Structure X (hooks and suckers) is for attachment to the intestinal wall.

9. D: Tapeworm dwells in the small intestine of large vertebrates; it is an endoparasite. Don't forget that tapeworms are in two: *Taenia solium* and *Taenia saginata*.

10. C: Possession of streamlined body is the major adaptation of a fish for easy locomotion in water.

11. A: Strong and blunt claws are adapted for digging (in search of food). What about sharp and hooked beak? Good! For predatory lifestyle.

12. D: It is highly tempting to give it to herbivores. However, being a herbivore does not automatically make an animal a "cud chewer". Chewing the cud is peculiar to ruminant (herbivores that have one kind of stomach known as the rumen).

13. D: The guard cell (labeled as IV) controls the loss of water vapour. It does this by regulating the opening and closing of the stomata.

14. C: The part labeled "I" is known as the cuticle.

15. B: Bladderwort is an example of carnivorous or insectivorous plants. These plants trap insects for their nitrogen supply. Other examples are butterwort, sundew, venus fly trap etc.

16. D: Emulsification of fat, which is the breaking down of fat into small droplets so as to enhance digestion, occurs in the small intestine (labeled "IV"). Don't forget the role of bile in emulsification.

17. C: The plant labeled "III" is the stomach. The content of the stomach is acidic due to the presence of hydrochloric acid.

18. D: The structure in a bird where food is being ground is known as the gizzard.

19. A: The blood flows from the heart through the artery, into the arteriole and finally into the tissues. The sequence is: Heart → artery → arteriole → tissue.

20. D: Glycolysis occurs in the cytoplasm as it does not require oxygen. Thus, the enzymes of the glycolytic pathway are located in the cytoplasm.

21. C: The malpighian tubule of an insect is similar (in function) to the kidneys of a man – they are both excretory structures.

22. A: The appendicular skeleton comprises the limbs and the limb girdles while the axial skeleton comprises the skull, vertebral column, the sternum and the ribs.

23. B: The male sex cells of a plant are the pollen grains. The pollen grains are situated in the anther (labeled as II).

24. C: Since the flower has conspicuous petals, it will attract insects. Therefore, the most likely pollinating agents are insects.

25. B: The reproductive system of a male mammal is made up of testis, prostate gland, sperm duct and vas deferens.

26. B: Air and water enter the embryo of a seed through the micropyle.

27. B: The eye defect is called hypermetropia or long sightedness. It is a defect of the eye that does not allow nearby objects to be seen clearly.

28. B: Hypermetropia is corrected by convex or converging lens. Even from the name of the lens, one can already deduce that its function is to bring light rays to a focus on the retina by converging them.

29. A: Rainfall is the most important ecological factor in a terrestrial environment.

30. D: The bacterial that are found in the caecum of ruminants help them with the digestion of the vegetable eaten. The ruminants in turn provide food and shelter for them.

31. A: The role of a contractile vacuole is to remove excess water from a cell. If an organism (protozoa) does not have a contractile vacuole, it implies that its cytoplasm has the same concentration as that of the aquatic environment (isotonic).

32. A: The substratum in marshes and swamps is quite unlikely to support large organisms.

33. C: The desert is characterized by cold nights, hot days and rainfall of about 25cm per annum.

34. D: Zones I and III have few organisms. Thus, it can be concluded that they are the zones of physiological stress.

35. B: The largest population size occurs when the temperature is 50°C. Hence, 50°C is the optimum temperature of the organism.

36. Mass of crucible = 10g
Mass of crucible and soil before heating = 29g
Thus, mass of soil before heating = 29 – 10 = 19g

Mass of a crucible and soil after heating = 18g
Then, mass of soil after heating = 18g – 10g = 8g

Mass of water in the soil = 19g – 8g = 11g

Percentage of water = $\frac{11g}{19g} \times 100\% = 57.89\%$

37. C: Onchocerciasis, schistosomiasis and salmonellosis are associated with water.

38. A: The gases released when fossil fuels are burnt are highly culpable for global warming.

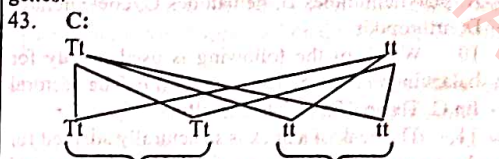
39. B: Variation refers to the differences noted among organisms of the same species.

40. B: A phenotypic character that has intermediate forms which can be graded from one extreme end to the other is called a discontinuous variation while the one that cannot be so graded is a discontinuous variation. Examples of continuous

variations are skin colour, height, body weight etc. examples of discontinuous variations are the ability to roll the tongue, the ability to taste PTC etc.

41. D: The characteristics of the offspring can be predicted from those of the parents. This relies on the principle of heredity.

42. B: Discontinuous characters are controlled by the alleles of a single gene or a small number of genes.



Percentage of tongue rollers = $\frac{2}{4} \times 100\% = 50\%$

44. A: Haemophilia occurs as a result of genetic mutation.

45. C: Down feathers help in keeping birds warm as they are very soft and fluffy.

46. B: Plants that grow in an area that is neither too wet nor too dry are called mesophytes. Those that grow in abundance of water are called hydrophytes while those that grow where there is very little amount of water are called xerophytes.

47. D: Insects are highly adapted for water conservation.

48. B: Some organisms (most noticeably, the chameleons) are able to change their colours; this they do with the aid of special pigment cells known as the chromatophores.

49. A: Hibernation is a process by which cold blooded animals maintain their body temperature and protect themselves from cold temperature during winter.

50. A: The driving force behind evolutionary change, according to Charles Darwin, is natural selection.

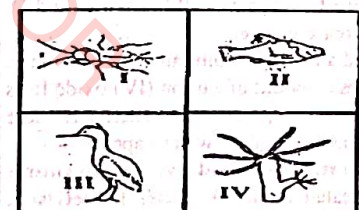
U. M. E BIOLOGY 2008

1. In terms of the number of individuals, which of the following tax a is most inclusive? A. Order B. Family C. Class D. Species

2. A characteristic that can possibly be shared by both living and non-living organisms is A. locomotion B. irritability B. increase in biomass C. increase in size

3. The cell of an onion bulb can be differentiated from a cheek cell by the presence of A. plasma lemma B. chloroplast C. cell wall D. nucleus

Use the diagram below to answer questions 4 and 5

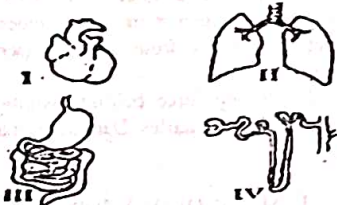


4. Which of the organisms is characterized by the possession of a chitinous exoskeleton? A. I B. II C. III D. IV

5. The type of reproduction illustrated in IV is A. sexual B. conjugation C. binary fission D. budding

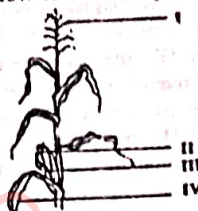
6. In plants, the structure that performs a similar function with the testis in mammals is the A. stigma B. filament C. anther D. replace

7. The bacteria type that are arranged in chains are the A. Staphylococci B. Clostridia C. Streptococci D. Bacilli
8. The most abundant group of organisms in the animal kingdom is A. Mammalia B. Aves C. Annelida D. Insecta
9. Radial symmetry is a feature common to the A. platyhelminthes B. nematodes C. coelenterates D. arthropods
10. Which of the following is used mainly for balancing in fish? A. The caudal fin B. The pectoral fin C. The anal fin D. The dorsal fin
11. The beak of a duck is structurally adapted for A. scooping and sieving food B. catching and grasping food C. picking and cracking food D. boring and sucking food
12. The most important characteristic that makes reptiles to conquer terrestrial habitats is the possession of A. long tail B. scaly skin C. sharp claw D. amniotic egg
13. In a dicotyledonous stem, the zone between the epidermis and the pericycle is the A. cortex B. stele C. xylem D. phloem
14. The order of passage of food in the digestive system is A. ileum caecum large intestine rectum B. ileum colon caecum rectum C. large intestine ileum caecum rectum D. colon caecum ileum rectum
15. Insectivorous plants trap and kill their prey to derive A. phosphorus B. calcium C. nitrogen D. Zinc
- Use the diagram below to answer questions 16 and 17.



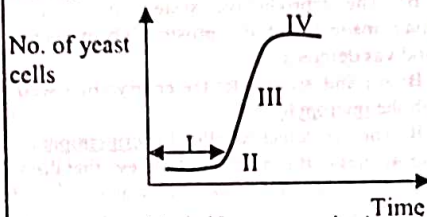
16. Water reabsorption takes place in A. II and III B. III and IV C. I and IV D. I and III
17. The vessel that carries blood from I to II is the A. pulmonary artery B. pulmonary vein C. carotid artery D. jugular vein
18. In the alimentary system of a bird, the function of teeth is carried out by the A. crop B. Beak C. gizzard D. tongue
19. What will happen when two equal sized pieces of unripe pawpaw labeled X and Y are dropped into equal volumes of concentrated salt solution and distilled water respectively? A. Pawpaw X will become turgid B. Both will increase in size C. pawpaw will become turgid D. Both will decrease in size
20. Exhaled air differs from inhaled air in that it A. contains less amount of carbon (IV) oxide B. is usually lower in temperature C. often has more oxygen D. usually has more water vapour
21. In the mammalian kidney, the Bowman's capsule is located in the A. ureter B. pelvis C. cortex D. medulla
22. A plant parenchyma cell also acts as a supporting tissue when it A. becomes flaccid C. becomes turgid B. contains crystals D. is pigmented

Use the diagram below to answer questions 23 and 24



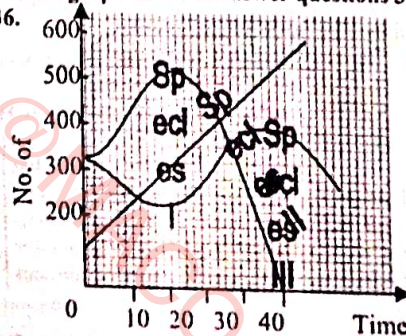
23. The illustration is a typical example of a plant pollinated by A. wind B. man C. insects D. birds
24. The male inflorescence is labeled A. I B. II C. III D. IV
25. During ovulation, an egg is released from the A. corpus luteum B. ovarian funnel C. Graafian follicle D. fallopian tube

Use the diagram below to answer questions 26 and 27.



26. The part labeled I represents the A. stationary phase B. lag phase C. log phase D. steady phase
27. The part labeled IV indicates that the yeast population has A. reached its maximum size B. reached senescence C. stopped metabolizing food D. started dying
28. The transmission of V impulses along a nerve fibre is characterized by A. hormonal and temperature changes B. electrical and ionic changes C. hormonal changes D. electrostatic changes
29. The major consequence of bush burning in an ecosystem is A. the loss of water absorbing ability of the soil B. the loss of biological diversity C. a decrease in animal population D. an increase in soil fertility
30. Which of the following associations is an example of mutualism? A. hydra viridis and zoochlorellae B. Human and lice C. Shark and Remora fish D. Bread and Rhizopus stolonifer
31. In a typical freshwater habitat, the edge of the stream or pond constitutes the A. tidal zone B. intertidal zone C. littoral zone D. euphotic zone
32. The main ecological problem facing intertidal organisms is A. desiccation B. floatation C. salinity D. humidity
33. Stomata of some plants are sunken and protected by hairs. These are features of A. Mesophytes B. epiphytes C. hydrophytes D. Xerophytes
34. An ecological factor that will have the most limiting effect on the abundance of phytoplankton in a turbid pond is A. pH B. oxygen C. light D. temperature

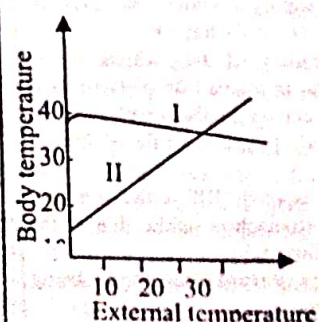
Use the graph below to answer questions 35 and 36.



35. If species I, II and III interact in a community, which of the following statements is true? A. The population of species II is growing at a slow rate B. The population of species III has reached its carrying capacity C. The population of species I has become extinct D. The population of species I is always higher than species II
36. The population size of species II on the 20th day is A. 100 B. 200 C. 300 D. 400
37. In an experiment to determine the percentage of air in a soil sample, the following readings were recorded: Volume of water in a measuring cylinder = 500cm³, Volume of soil added to water = 350cm³, Volume of water and soil after stirring = 800cm³. The percentage of air in the soil sample is A. 6.25% B. 10.36% C. 14.28% D. 43.28%
38. A boy who is fond of swimming in a pond finds himself passing urine with traces of blood. He is likely to have contracted A. schistosomiasis B. onchocerciasis C. poliomyelitis D. salmonellosis
39. The easiest way to establish the level of pollution in a local stream is to measure the level of A. oxygen B. carbon(IV) oxide C. ammonia D. alkalinity
40. Which of the following is a major case of variation among organisms? A. in breeding B. Backcrossing C. sexual reproduction D. Gene dominance
41. The Rhesus factor of blood was first identified in a category of A. monkeys B. human females C. human males D. chimpanzees
- Use the diagram below to answer questions 42 and 43.

		Gametes	
		T	t
O	+		
	G		
am	T	I	II
	e		
t	+		
	G		
e	T	III	IV
	t		

42. Which of the four offspring of the cross will short if T the gene for tallness is dominant to A. I B. II C. III D. IV
43. The genotypic ratio of the offspring of the cross is A. 1:2 B. 1:2:1 C. 1:1:1:1 D. 3:1
44. Genetically modified food products have not become universally accepted because A. they are not tasty as others, produced by conventional means B. they are usually costlier than others produced by conventional means C. their effects on human consumers is not yet fully understood D. the technology can be applied only in developed countries
45. A major adaptive feature of endoparasites is the A. loss of the organ of movement B. presence of claws C. loss of the central nervous system D. presence of piercing mouthparts
- Use the diagram below to answer questions 46 and 47.



46. From the graph above, it can be appropriately deduced that A. the body temperature in II varies with that in IB. the body temperature in I is independent of external temperature C. I and II Maintain constant body temperature D. external temperatures affect the body temperature of I and II
47. The animal represented by I is a A. poikilotherm B. homiotherm C. carnivore D. herbivore
48. The ability of a chameleon to change its colour is an adaptive feature for A. attraction B. defence C. display D. attack
49. Which of the following is the most advanced evolutionary development in plants? A. Possession of unicellular structures B. Development of flowers C. Dispersal of spores D. Development of secondary thickening
50. The natural process that produces adaptive evolutionary changes is A. mutation B. gene flow C. genetic drift D. natural selection

U.M.E. Biology 2008 Solution

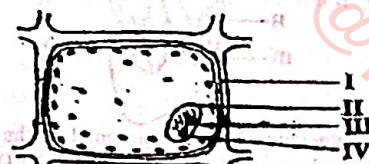
1. C: The most inclusive tax a (in terms of the number of individuals) is the kingdom while the least inclusive is the species. Kingdom > Phylum > Class > Order > Family > Genus > Species. From the list given, the most inclusive is the class.
2. A: It is possible for a non-living thing to move. For example, a car can move if fuel is available.
3. B: The onion bulb is a plant tissue. Hence, its cell wall have chloroplasts whereas a cheek cell (from animal) will not have.
4. A: The possession of chitinous exoskeleton is a feature of insects. "I" is an insect, "II" is a fish, "III" is a bird while "IV" refers to hydra.
5. D: Hydra reproduces by bud formation (budding).
6. C: Just the same way sperms are produced from the testis, pollen grains are produced from the anther.
7. C: Bacilli bacteria are those that are rod shaped, cocci bacteria are circular in shape, spirochaete bacteria have cock-screw shapes. Cocci bacteria may stick together to form a long chain, this is known as streptococci.
8. D: The arthropods (especially insects) are the most abundant group of organisms in the animal kingdom.
9. C: An organism that can be cut along an plane to give two identical halves is said to be radially symmetrical. Coelenterates are radially symmetrical.
10. D: The major fins used by a fish for maintaining balance are dorsal and ventral fins.
11. A: The beak of a duck is structurally adapted for scooping and sieving food.
12. B: The scaly skin is the most important characteristics that makes reptiles live successfully in terrestrial habitats. It prevents reptiles from getting desiccated.
13. A: In a dicotyledonous stem, the cortex lies between the epidermis and the pericycle.
14. B: The food moves from the ileum (one of the three main divisions of the small intestine) to the colon (a part of the large intestine). It then moves from the colon to the caecum, and finally to the rectum. Thus, the sequence is: Ileum → colon → caecum → rectum.
15. C: Insectivorous or carnivorous plants trap and kill their prey in order to derive nitrogen. This is because these plants normally grow in areas with little nitrogen supply.

16. B: Water reabsorption occurs in the nephron (of the kidneys). Water is also absorbed from undigested food in the colon.
17. A: "I" represents the heart while "II" represents the lungs. The blood vessel that carries blood from the heart to the lungs is known as the pulmonary artery while the one that returns blood from the lungs to the heart is known as the pulmonary vein.
18. C: Just as the teeth are used for grinding food, some stone-like substances found in the gizzard of a bird act.
19. C: Concentrated salt solution is hypertonic to the content of the cytoplasm of the cells in pawpaw X. This causes the outflow of water from the pawpaw. Distilled water, on the other hand, is hypotonic to the content of the cytoplasm of the cells in pawpaw Y. This causes the in-flow of water into the pawpaw. Summarily, the two events cause X to become progressively flaccid while Y becomes turgid.
20. D: The exhaled air contains more CO₂, H₂O and heat than inhaled air. This is because these substances are produced as by-products of cellular respiration. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{Energy}$
21. C: The Bowman's capsule of the mammalian kidney is located in the cortex, not the medulla
22. C: A plant parenchyma cells can act as a supporting tissue when it is turgid.
23. A: "I" is the male inflorescence "II" represents the styles, "III" is the female inflorescence while "IV" is a leaf. In wind pollinated flowers, the male inflorescence is positioned in such a way that they swing readily in air, causing them to release the pollen grains easily; such is the case with the diagram given.
24. A: As indicated earlier, the structure labeled "I" is the male inflorescence.
25. C: During ovulation, an egg is released from the graffian follicle. Note that the ovarian follicle is also the same as the graffian follicle.
26. B: Stage "I" represents the lag phase, stage "II" represents the acceleration phase, stage "III" represents the steady phase while stage "IV" represented the stationary phase.
27. A: Stage "IV" (which is the stationary phase) indicates when the population has reached its maximum size.
28. B: The transmission of impulses along a nerve fibre is characterized by electrical and ionic changes.
29. B: The major consequence of bush burning in an ecosystem is the loss of biological diversity as it leads to the elimination of many species. Option C is incorrect because animals are not the only ones affected.
30. A: Human and lice → Parasitism
Shark and Remora fish → commensalism
Bread and rhizopus stolonifer → saprophytism
Hydra viridis and zoochlorellae → mutualism
31. C: The littoral zone is the shallow part of fresh water habitat. The deep part of the fresh water is known as the benthic zone.
32. A: The main ecological problem facing intertidal organisms is desiccation. This is because the intertidal zone is exposed when the tide is low; thus the organisms are susceptible to drying out.
33. D: Sunken and hairy stomata reduce the amount of water loss. Thus, it is an adaptation of xerophytes. Remember that xerophytes are plants that grow in areas with little access to water. Hence, water conservation is extremely essential.

34. C: The factor that is mostly likely to limit the abundance of phytoplankton in a turbid pond is light. This is because lack of light hinders the ability of phytoplanktons to photosynthesize.
35. C: The population of species "I" eventually becomes zero (at day 50). This suggests that the population has become extinct.
36. B: As can be read from the graph, the population size of species II on the 20th day is about 200.
37. C: Volume of water = 500cm³, volume of soil added = 3500cm³, Total expected volume = 8500cm³. But the volume recorded after stirring = 800cm³. Why is this? It is simply because some air has escaped. Thus, volume of air in the soil = $(\frac{50}{350}) \times 100\% = 14.28\%$
38. A: Dschistosomiasis is commonly characterized by the patient's frequent urge to urinate and bloody urine.
39. A: The level of pollution in a local stream can be established by measuring the level of oxygen in the stream. This is not far fetched, the more polluted the stream is, the more the oxygen-consuming organisms and subsequently the less the amount of oxygen available.
40. C: Sexual reproduction involves random combination of genes - this is the source of variation.
41. A: The rhesus of blood was first identified in rhesus monkeys.
42. D: We are to simply match the rows and the columns
- | | | |
|---|----|----|
| | T | T |
| T | TT | Tt |
| T | Tt | tt |
43. B: As can be seen from the table, the genotypic ratio is 1 : 2 : 1 while the phenotypic ratio is 3 : 1.
44. C: This is because their effects on human consumers are yet to be understood.
45. D: The major adaptive feature of endoparasites is its possession of structures that enhance absorption of nutrient.
46. B: From the graph, it is obvious that the body temperature in "I" is independent of external temperature
47. B: An organism whose body temperature does not depend on that of the environment is said to be homiothermic
48. B: The ability of a chameleon to change its colour is an adaptive feature of protection (or defence). This is because the animal can remain unnoticed with this
49. B: The flowering plants are the most advanced plants. Thus, the development of lowers is considered the most advanced evolutionary development.
50. D: Natural selection is the natural process that produces adaptive evolutionary changes.

U. M. E BIOLOGY MAY 2007 Question Paper Type: 7

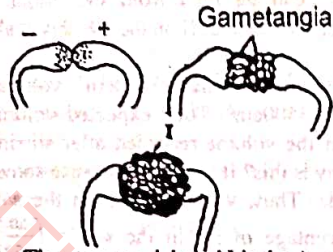
Use the diagram below to answer questions 1 to 2



1. The organelle responsible for heredity is A. IV B. I C. II D. III

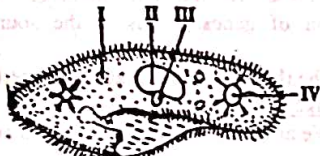
2. The part labeled I is the A. cell wall B. plasmalemma C. nuclear membrane D. endoplasmic reticulum
3. The chromosomes of members of the Kingdom are within the A. nucleus B. nucleolus C. cytoplasm D. nucleoplasm

Use the diagram below to answer questions 4 to 5



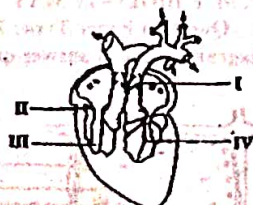
4. The structure labeled I is the A. conidiospore B. sporangium C. hypha D. zygospore
5. The process illustrated is A. sexual reproduction in Rhizopus B. sexual reproduction in Spirogyra C. septulation D. gametogenesis
6. A water medium is necessary for fertilization in A. angiosperms B. ferns C. fungi D. conifers
7. The process of shedding the exoskeleton of an arthropod is known as A. instar formation B. metamorphosis C. tagmosis D. ecdysis

Use the diagram below to answer questions 8 to 9



8. The part labeled IV is responsible for A. ingestion B. locomotion C. osmoregulation D. respiration
9. The organelle responsible for sexual reproduction is A. I B. II C. III D. IV
10. Which of the following is common to the mosquito, housefly and blackfly? A. Their immature stages are aquatic B. They undergo complete metamorphosis C. Their adults have two pairs of wings D. They are parasites of man.
11. Which of the following has the most primitive respiratory system? A. Fish B. Snail C. Mouse D. Insect
12. Monocot stems differ from dicot stems in that monocots have A. fewer vascular bundles B. no cambium C. phloems with parenchyma D. no pith
13. In mammals, the organ directly on top of the kidney is the A. prostate gland B. pancreas C. thyroid gland D. adrenal gland
14. The photosynthetic pigments include A. melanin and haemoglobin B. chlorophyll and carotenoids C. carotenoids and haemoglobin D. chloroplasts and cytochromes
15. The pancreas secretes enzymes for the digestion of A. fats, vitamins and cellulose B. fats, carbohydrates and vitamins C. proteins, cellulose and minerals D. fats, proteins and carbohydrates.

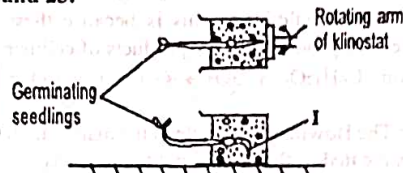
Use the diagram below to answer questions 16 and 17.



16. Oxygenated blood is pumped to the entire body from the part labeled A. I B. II C. III D. IV

17. The part labeled I is the A. bicuspid valve B. aorta C. vena cava D. pulmonary artery
18. Which of the following uses diffusion as the principal method of gaseous exchange? A. Rat B. Lizard C. Earthworm D. Grasshopper
19. The opening and closing of the stoma are regulated by A. osmosis B. diffusion C. transpiration D. respiration
20. The waste product of plants used in the conversion of hide to leather is A. resin B. tannin C. gum D. Alkaloid
21. The correct sequence of the movement of urea during urine formation is A. convoluted tubule → glomerulus → Henle's loop → Bowman's capsule → collecting tubule B. Glomerulus → Bowman's capsule → convoluted tubule → Henle's loop → collecting tubule C. convoluted tubule → Bowman's capsule → Henle's loop → glomerulus → collecting tubule D. Glomerulus → Bowman's capsule → convoluted tubule → Henle's loop → convoluted tubule → collecting tubule.

Use the diagram below to answer questions 22 and 23.



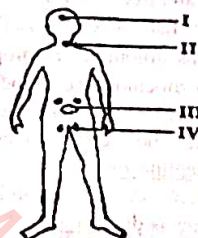
22. The part marked I will contain a high concentration of A. ethylene B. ascorbic acid C. auxin D. abscisic acid
23. The experiment demonstrates A. hydrotropism B. geotropism C. thigmotropism D. phototropism
24. Pineapple is an example of A. a composite fruit B. a simple fruit C. an aggregate fruit D. a dehiscent fruit

Use the diagram below to answer questions 25 and 26.



25. The diagram shows that the organisms are A. viviparous B. oviparous C. ovoviviparous D. hermaphrodite
26. The breeding posture illustrated in the diagram is known as A. reproductive swimming B. courtship display C. mating D. amplexus
27. Stunted growth and poor root development are a result of a deficiency in A. Calcium B. sulphur C. iron D. Phosphorus

Use the diagram below to answer questions 28 and 29.



28. The function of the structure labeled I is to A. regulate the activities of other endocrine glands B. stimulate the development of secondary sexual characters C. prepare the body for any emergency

D. maintain proper glucose concentration in the blood

29. Insulin is produced by the endocrine organ labeled A. I B. II C. III D. IV

30. The highest level of ecological organization is the A. niche B. biosphere C. population D. ecosystem

31. Abiotic factor which affects the distribution and abundance of organisms in a terrestrial habitat is A. competition B. temperature C. light D. pH

32. Which of the following is an example of parasitism? A. Mistletoe growing on an orange tree B. Fungi growing on a dead tree branch C. Cattle egrets taking ticks from the body of cattle. D. Asquirrel living in an abandoned nest of a bird

33. The organs that will be most useful to giant African rats in finding their way in underground habitats are the A. Eyes B. vibrissae C. tails D. Nostrils

34. One adaptation shown by hydrophytes in fresh water habitats is the A. poor development of roots and xylem tissues B. well-developed roots and supporting system C. leaves reduced to spines D. waxy cuticle on shoot surface

35. The mangrove swamp in Nigeria is restricted to the A. Guinea savanna B. Tropical rain forest C. Sudan savanna D. Sahel savanna

36. In which of the following Nigerian states can montane vegetation be found? A. Plateau B. Taraba C. Enugu D. Bauchi

37. The increasing order of the particle size in the following soil types is A. clay → silt → sand → gravel B. Silt → clay → sand → gravel C. Clay → sand → silt → gravel D. Silt → sand → clay → gravel

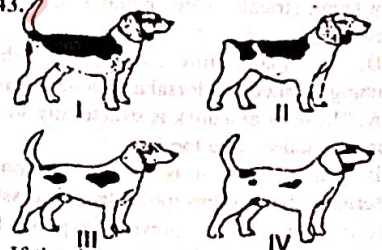
38. A crucible of 5 gm, weighed 10gm after filling with fresh soil. It is then heated in an oven at 100°C for 1 hour. After cooling in a desiccator, the weight was 8 gm. The percentage of water in the soil is A. 20% B. 40% C. 60% D. 80%

39. The causative agent of bird flu is a A. virus B. bacterium C. fungus D. protozoan

40. An accurate identification of a rapist can be carried out by conducting a A. blood group test B. behavioural traits test C. DNA analysis D. RNA analysis

41. Which of the following is true of cloning? A. It involves the asexual multiplication of the tissues of the original organisms B. The clone is similar to but not exactly like the original organism C. Only one cell of the original organism is needed to initiate the process. D. It is welcomed as an ethically and morally sound science.

Use the diagram below to answer questions 42 and 43.



42. If the dogs are offspring of a monohybrid cross and the gene G for grey head is dominant over its allele e.g. the individual whose genotype is likely to be egg is A. I B. II C. III D. IV

43. Which of the following will be true of dog II which lost its tail in an accident if it relates with dog III? A. All its offspring will be born without tails. B. ¼ of its offspring will be born without tails C. None of its offspring will be born without a tail D. ¾ of its offspring will be born without tails

44. An example of a sex-linked trait is the A. ability to roll the tongue B. possession of facial hair in adult humans C. ability to grow long hair in females D. colour of the skin in human.

45. Which of the following factors can bring about competition in a population? A. Drought B. Mortality C. Dispersion D. Emigration

46. In lizards, the lowering of the gular fold is used to A. attract mates B. frighten enemies C. catch insects D. defend their territory

Use the diagram below to answer questions 47 and 48.



47. The structure labeled I is A. tactile B. chemoreceptive C. photosensitive D. radiosensitive

48. The type of protective adaptation exhibited by the animals is A. flash colouration B. disruptive colouration C. warning colouration D. counter shading colouration

49. An example of a fish that aestivates is A. lung fish B. shark C. catfish D. croaker

50. The theory which supports the view that the large muscles developed by an athlete will be passed on to the offspring was proposed by A. Darwin B. Lamarck C. Pasteur D. Mendel.

U. M. E BIOLOGY MAY 2007 SOLUTION Question Paper Type: 7

1. C: The part labeled "III" is the chromosome. The unit of heredity (which is the gene) resides inside the chromosome.

2. B: The part labeled "I" is the cell membrane (plasmalemma). Please, be reminded that "I" does not represent the cell wall, the outer structure does.

3. C: Unlike eukaryotes that have their chromosomes in the nucleus, prokaryotes (monerans) have theirs dispersed within the cytoplasm.

4. D: Each Rhizopus strain comes forth with its gametangium; forming a zygospore. The part labeled "I" is the zygospore.

5. A: The diagram portrays the sexual reproduction in Rhizopus (also known as conjugation)

6. B: Water is required for fertilization in bryophytes (e.g. mosses) and pteridophytes (e.g. ferns).

7. D: The process of shedding the exoskeleton of an arthropod is known as moulting. The process is very essential for their growth. Moulting is also known as ecdysis.

8. C: The part labeled "IV" is the contractile vacuole. The contractile vacuole is osmoregulatory in function.

9. C: The organelle responsible for sexual reproduction in paramecium is the micronucleus. The part designated as "III" is the micronucleus.

10. B: The three of mosquito, housefly and blackfly undergo complete metamorphosis.

11. C: Invertebrates have more primitive structures than vertebrates. Thus, fish and mouse are already out of question. It remains snail and insect! In the evolutionary trend (for invertebrates), mollusks (e.g. snails) come before arthropods (e.g. insects). Hence, snail has the most primitive respiratory system of them all.

12. B: Generally, dicots have cambium (with which they undergo secondary thickening) which monocots do not.

13. D: The adrenal gland is situated above the kidney. In fact "ad" means on top while "renal" is always related to the kidney(s). For instance, renal artery is the blood vessel that takes blood from the heart to the kidney.

14. B: Chlorophyll are the major photosynthetic pigments. Carotenoids, in addition, are also photosynthetic in role.

15. D: The main enzymes secreted by the pancreas are trypsin, lipase and amylase which digest proteins, fats and carbohydrates respectively.

16. D: The left ventricle is the chamber of the heart from which oxygenated blood is pumped to the entire body. The part labeled "IV" is the left ventricle.

17. B: The part labeled "I" is the aorta. The aorta is the largest artery in the body.

18. C: Rat, lizard and grasshopper are too big to use diffusion for gaseous exchange. Small organisms (like protozoans), which have large surface area to volume ratio, use diffusion as their principal method of gaseous exchange. Don't forget that large animals have small surface area to volume ratio.

19. A: The opening and closing of the stoma are regulated by osmosis. When the guard cell absorbs water, it becomes turgid, consequently leading to opening of the stomata. The reverse causes closing of the stomata.

20. B: The waste product of plants used in the conversion of hide to leather is tannin.

21. D: The correct sequence is: glomerulus → Bowman's capsule → proximal convoluted tubule → Henle's loop → distal convoluted tubule → collecting tubule

22. C: Auxins are produced from root and stem apices. Thus, the part marked "I" will contain a high concentration of auxin

23. B: The experiment demonstrates geotropism. Note that roots are generally positively geotropic while stems are negatively geotropic.

24. A: Pineapple is a composite fruit. A fruit that is formed from an inflorescence is known as a composite or multiple fruit.

25. B: In the mating process shown, the female toad lays eggs while the male pours sperms on them. Generally speaking, when an organism reproduces by laying eggs, it is said to be oviparous. An organism that gives birth to a living young one (e.g. human being) is said to be viviparous.

26. C: As said earlier, the toads are mating.

27. A: Stunted growth and poor root development are deficiency symptoms of calcium.

28. A: The gland located at "I" is the pituitary gland. The pituitary gland (the master gland) coordinate the activities of other endocrine glands.

29. C: Insulin, alongside with glucagon, is produced in the pancreas. The pancreas is situated at the position labeled "III".

30. D: The highest level of ecological organization is the ecosystem.

31. B: Temperature and rainfall are the most important abiotic factors affecting the distribution and abundance of organisms in a territorial habitat

32. A: Mistletoe obtains nutrients from the orange tree, leaving the tree malnourished. This is an example of parasitism.

33. B: One could be tempted to opt for "A", eyes are not so useful in this scenario. Remember we are

dealing with underground habitats. Thus, the rat will be very unlikely to see in this dark dungeon. The organs that will come handy are the vibrissae or whiskers.

34. A: Good roots, efficient xylem, small leaves, presence of cuticle etc. are adaptations for obtaining and conserving water. An aquatic plant (hydrophyte) does not really need this. Why? It is in water and water conservation and sophisticated water transport system are not of much importance.

35. B: In Nigeria, the mangrove swamp is restricted to the tropical savanna.

36. A: Montane vegetation abound sufficiently in plateau state.

37. The order is: clay → silt → sand → gravel

38. B: Mass of crucible = 5g

Mass of crucible + fresh soil = 10g

∴ Mass of fresh soil = 10g - 5g = 5g

Mass after heating = 8g - 5g = 3g

Thus, mass of water = 5g - 3g = 2g

Percentage of water = $\frac{2g}{5g} \times 100\% = 40\%$

39. A: The causative agent of bird flu is a virus.

40. C: The best way around identifying a rapist is DNA analysis.

41. C: Cloning involves the use of a single cell to produce an identical whole organism.

42. D: Since it has been said that G (the allele for grey head) is dominant over g, the dog that will likely be gg is the one that lacks grey head.

43. C: None will be born without tail because acquired characters are not heritable.

44. B: Possession of facial hair in adult human is a sex-linked characteristics; it is peculiar to male human beings.

45. A: Drought causes food shortage which in turn causes competition.

46. A: The lowering of gular fold in lizards is used to attract mates.

47. A: The structure labeled "I" represents the whiskers or vibrissae. A whisker is tactile i.e. sensitive to touch.

48. D: The animal shows counter shading colouration as a protective adaptation.

49. A: The lung fish is an example of fishes that aestivate.

50. B: The theory that erroneously asserted that acquired characters are heritable was propounded by Jean Baptiste Lamarck.

BIOLOGY U. M. E. 2006 QUESTION PAPER TYPE S

1. Mendel's second law of inheritance states that A. alleles separate predictably B. alleles segregate independently C. chromosomes segregate independently D. alleles combine randomly.

2. One advantage of variation in a species population is that individuals A. easily reach their reproduction age B. with favoured trait become dominant C. are better adapted to changes D. are easily recognised by mates

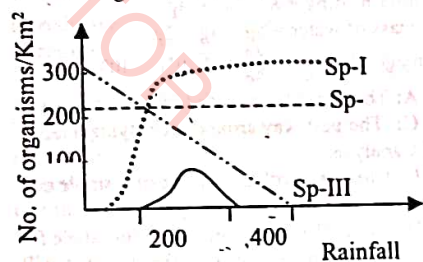
3. The two normal types of sex chromosomes are A. xxy and xyy B. xx and xyy C. xx and xy D. xyxy

Use the diagram below to answer questions 4 and 5.



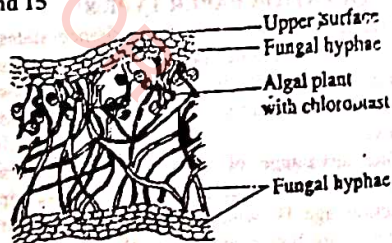
4. The part labeled I represents the A. deoxyribose sugar B. ribose sugar C. phosphate linkage D. base pairs
5. The diagram represents the structure of A. DNA B. Chromosomes C. RNAD. proteins.
6. Hassan and Hussain are identical twins but Hassan grow staller and fatter than Hussain. This is probably because. A. Hussain is endowed with genes for shortness and thinness B. they are raised in different environments C. they have dissimilar genotypes D. Hassan inherits genes for tallness and fatness from the father.
7. A population that doubles in size at constant intervals is an indication of A. sigmoid growth B. population explosion C. rapid growth D. exponential growth
8. The causative agent of typhoid fever is A. Entamoeba B. Salmonella C. Shigella D. Escherichia

Use the diagram below to questions 9 and 10.



9. Which of the following can be deduced from the distribution? A. species III increases in number as rainfall increases B. The distribution of species IV is not dependent on rainfall C. species I thrives under condition of moderate to high rainfall D. species II is found only in locations where it rains all year round
10. The species whose distribution is not affected by rainfall is A. IV B. III C. I D. II
11. The soil type that contains nutrients which are not readily available for plants is A. sandy B. Alluvial C. loamy D. clayey
12. Grasses recover quickly from bush fires in the savanna because of their A. succulent stems B. rapid growth rate C. fibrous roots D. perennating organs
13. The main purpose of establishing shelter belts in the sahel region is to A. break the harmattan wind B. beautify the region C. check desert encroachment D. provide wood fuel

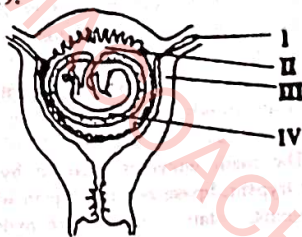
Use the diagram below to answer questions 14 and 15



14. The importance of the association to the fungus is that it obtains A. oxygen and carbohydrates from the algae B. a partner for reproduction C. anchorage from the algae D. water and mineral salts from the algae
15. The association illustrated demonstrates A. commensalism B. Mutualism C. saprophytism D. parasitism.
16. Climax communities in a biotic-succession are usually characterized by A. a constant change in the appearance of the commodities. B. a stable composition of plant and animal species C. rapid

changes in the plant and animal species. D. different species that are constantly changing.

17. The product of excretion common to the mammalian kidney, lung and skin is A. Urea B. Carbon(IV)oxide C. mineral salt D. Water
- Use the diagram below to answer questions 18 and 19.



18. The organ through which the embryo receives food, water and oxygen is labeled A. II B. III C. IV D. I
19. The part labeled IV is for A. excretion B. Protection C. nourishment D. respiration.
20. In rabbits, the chamber of the heart that receives oxygenated blood from the lungs is the A. left auricle B. right auricle C. left ventricle D. right ventricle.
21. One basic similarity between nervous and endocrine system is that both A. produce precise and short - lived effects B. involve the use of chemical substances C. transmit very fast impulses D. produce widespread effects.
22. Night blindness result from a deficiency of A. vitamin E B. vitamin KC. vitamin C D. vitamin A
23. Water is necessary for a germinating seed because it A. wets the soil for proper germination B. protects the seed from desiccation C. activates the enzymes D. promotes aerobic respiration
24. An increase in air pressure in the lungs is due to the A. increase in the volume of the thoracic cavity B. relaxation of the diaphragm C. upward movement of the ribs D. contraction of intercostal muscles

25. In the transverse section of a dicot stem, the region lying between the endodermis and the vascular bundle is the A. parenchyma B. Phloem C. hypodermis D pericycle

26. A unique characteristic of the cervical vertebrae is the presence of A. long transverse processes B. zygopophysis C. vertebral arterial canal D. large centrum.

27. Which of the following produces both hormones and enzymes? A. Gall bladder B. Ileum C. pancreas P. kidney

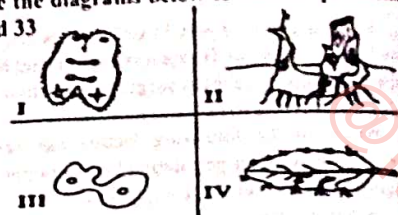
28. The formation of water in tissue respiration results from the A. combination of water molecules B. breakdown of water molecules C. reduction of carbon (IV) oxide D. reduction of oxygen by hydrogen

29. The organ situated in the pericardial cavity of a mammal is the A. stomach B. Liver C. heart D. spleen

30. Mammals are capable of producing hypertonic urine mainly because of reabsorption in the A. urethra B. loop of Henle C. ureter D. Bowman's capsule

31. The mammalian vein which starts with and ends in a capillary network is the A. hepatic portal vein B. pulmonary vein C. renal vein D. mesenteric vein.

Use the diagrams below to answer questions 32 and 33

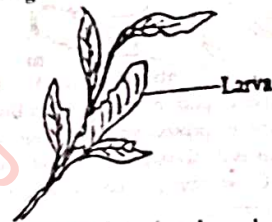


32. A plant that exhibits the types of reproduction shown in IV is A. Bryophyllum B. cola C. sugar cane D. ginger

33. Sexual reproduction is illustrated in A. I B. II C. III D. IV

34. The part of the mammalian skin involved in temperature regulation is the A. sebaceous gland B. sweat gland C. hair follicle D. hair papilla

Use the diagram below to answer questions 35 and 36.



35. The types of adaptation shown by the larva is A. counter shading B. flash coloration C. mimicry P. disruptive coloration.

36. Economic importance of the larva is that it A. Feeds on the leaves of crops B. resembles the plant on which it lives C. develops into a moth D. is eaten by birds

37. The intensity of competition among animals in a given area will increase with A. a decrease in immigration rate B. an increase in the frequency of disease outbreaks C. an increase in population size D. an increase in the emigration rate.

Use the diagram below to answer questions 38 and 39



38. The variation illustrated is A. physiological B. discontinuous C. morphological D. biochemical

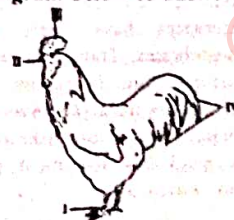
39. The change in the length of the necks of the giraffes shown was brought about by A. predation B. Symbiosis C. natural selection D. geographical isolation

40. Which of the following vertebrates has the most simple structured heart? A. fish B. Mammal C. Amphibian D. Reptile

41. The role of the Golgi complex in a eukaryotic cell is to A. transport genetic material out of the cell B. transport organic materials in and out of the cell C. provide attachment for ribosomal granules D. conduct ions in and out of the cell

42. The dominant phase in the life cycle of a bryophyte is the A. prothallus B. Gametangium C. sporophyte D. gametophyte.

Use the diagram below to answer questions 43 and 44



43. The structures used for offence and defence are labeled A, I and II B. I and IV C. II and III D. III and IV

44. A unique characteristic that distinguishes the class of vertebrates represented from other vertebrates is the presence of A. a covering of feathers B. a pair of wing C. scales on the lower legs D. two pairs of limbs

45. The evidence that supports the advancement of fern over mosses is derived from A. biochemical similarities B. comparative anatomy C. physiological records D. molecular records

46. A characteristic that best exemplifies the evolutionary advancement of mammals over other vertebrates is the A. terrestrial mode of life B. possession of paired limbs C. viviparous mode of reproduction D. possession of a heart

47. One primitive feature of the coelenterates is the possession of A. bilateral symmetry B. a dorsal mouth C. A false foot D. radial symmetry

48. An organism which exhibits extracellular digestion is A. Paramecium B. Rhizopus C. Spirogyra D. Amoeba

Use the diagram below to answer questions 49 and 50



49. The structure labeled I. is sensitive to A. chemicals and touch B. chemicals only C. light only D. light and touch

50. The maxillary palp is labeled A. II B. III C. IV D. I.

BIOLOGY U. M. E. 2006 SOLUTION QUESTION PAPER TYPE S

1. B: Mendel's second law of inheritance, also known as the law of independent assortment of genes, implies that alleles segregate independently.

2. A: Variation in species favours some; leaving others at a disadvantage. Those organisms that show desirable variation dominate while others are left to struggle for existence.

3. C: The two normal types of sex chromosomes are XX (for females) and XY (for males)

4. D: The coiled portion is the sugar-phosphate backbone while the part labeled "I" represents the base pairs.

5. A: The diagram represents the structure of DNA. A DNA strand is made up of units called nucleotides.

6. B: Since the twins are identical, they inherit exactly the same set of genes. Thus, differences in their appearances can only be brought about by the environments.

7. D: A population that doubles in size at constant intervals is an indication of exponential growth. A typical example is the growth of bacteria.

8. B: The causative agent of typhoid fever is *Salmonella typhi*.

9. C: Species "III" decreases in number as rainfall increases

Species "II" is not affected by rainfall.

Species "I" thrives under condition of moderate to high rainfall.

10. D: The population of species II stays at 200 for every squared kilometer, regardless of the

rainfall. Thus, the distribution of species I is not affected by rainfall.

11. D: The nutrients in clay soil are not readily available for plants because they are "soil-bound".

12. D: Grasses recover quickly from bush fires in the savanna because of their perennating organs. Perennating organs are organs that enable some plants to survive from one growing season to the other. Examples are bulb, corm, sucker, runner etc.

13. A: The main purpose of establishing shelter belts in the sahel region is to break the harmattan wind.

14. A: The diagram is that of lichen - a symbiotic union between a fungus and algae. This is how it works: The fungi obtain nutrient from the algae (since the algae can photosynthesize) and in turn help the algae in absorbing water and mineral salts.

15. B: Since the two organisms benefit from the union, the association is an example of mutualism.

16. B: Climax communities in a biotic succession are usually characterized by a stable composition of plant and animal species.

17. D: All of mammalian kidney, lung and skin produce water as one of their excretory products.

18. A: The embryo receives food, water and oxygen from the mother through the embryo.

19. B: The part labeled "IV" is the amnion. The amnion produces amniotic fluid which protects the embryo against shock.

20. A: Deoxygenated blood moves from the right ventricle to the lungs through the pulmonary artery. After oxygenation, the blood is sent through the pulmonary vein into the left auricle.

21. B: Both nervous and endocrine system involve the use of chemical substances. Note essentially that nervous system produces short-lived effects while endocrine system produces long-lived effects.

22. D: Night blindness is a deficiency disease of vitamin A.

23. C: Water helps to activate the enzymes necessary for growth in the young seedling.

24. B: The external intercostal muscles relax and the internal ones contract, causing the diaphragm to relax. The ribs move downward and the volume of the thorax cage decreases.

25. D: The pericycle is situated between the vascular bundle and the endodermis.

26. C: The vertebral canal (which is for the passage of blood vessels) is peculiar to the cervical vertebrae.

27. C: The pancreas produces both hormones and enzymes.

28. - The hormones produced in the pancreas are insulin and glucagon (which are used for blood sugar regulation). The enzymes produced by the pancreas are lipase, amylase and trypsin.

29. C: The Pericardial cavity is the name given to the space that houses the mammalian heart.

30. B: The major re-absorption of water from urine occurs in the loop of Henle.

31. A: The hepatic portal vein is the only blood vessel that begins with and ends in capillaries.

32. A: This type of vegetative propagation is shown by bryophyllum.

33. A: Diagram "I" shows two parameciums undergoing conjugation. Conjugation is a sexual reproduction method.

34. B: The part of the mammalian skin primarily involved in temperature regulation is the sweat gland. During a hot day, the sweat gland produces sufficient of sweat. As the sweat evaporates, the body gets cooled.

35. A: The larva shows countershading. Countershading helps an organism to blend with its environment and as a result become unable to be detected.

36. A: The larva is a crop pest: It feeds on the leaves of crops.

37. C: As population increases, resources become insufficient; thus, competition ensues.

38. C: Morphological variation deals with the difference in forms and structures of organism of the same species.

39. D: The giraffes that were located at region where they had to stretch their neck for food became long-necked eventually.

40. A: The fish has the simplest structured heart. The heart of a fish comprises only one auricle and one ventricle.

41. B: The golgi complex or golgi apparatus (named after Camillo Golgi) transports organic materials in and out of the cell.

42. D: The dominant phase in the life cycle of a bryophyte is the gametophyte while that of a pteridophyte is the sporophyte.

43. A: The beak (II) and feet (I) of a bird can be employed for offence and defence.

44. A: Possession of feathers distinguishes birds from other vertebrates.

45. B: The evidence that supports the advancement of ferns over mosses is derived from comparative anatomy.

46. C: Mammals are viviparous (they give birth to young ones alive) while other vertebrates are oviparous (they lay eggs).

47. D: Radial symmetry is a primitive feature.

48. B: Rhizopus feeds on dead and decaying organic matter. The digestion occurs extracellularly.

49. A: The structure labeled "I" is the antenna. The antenna is sensitive to chemical and touch. In some insects, the antenna is even sensitive to sound.

50. C: The structure labeled "IV" is the maxillary pulp.

U. M. E BIOLOGY 2005

1. The organelle common to both plant and animal cells is the A. centriole B. plasmalemma C. cell wall D. chloroplast.

2. Which of the following is likely to have a higher concentration of mitochondria? A. Sperm cell B. White blood cell C. Egg cell D. Red blood cell.

3. The hyphal wall of fungi is rigid owing to the presence of A. cell wall B. lignin C. cellulose D. chitin.

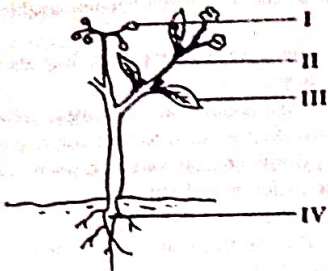
4. Angiosperms and gymnosperms belong to the class A. schizophyta B. spermatophyta C. pteridophyta D. bryophyta

5. An example of a radially symmetrical organism is A. Planaria B. Hydra C. tapeworm D. roundworm.

6. The leech and the earthworm belong to the A. molluscs B. crustaceans C. arachnids D. annelids.

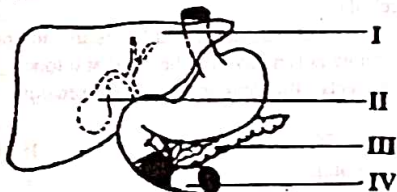
7. I. *Rattus rattus* II. *Agama agama* III. *Bufo regularis* IV. *Tilapia zill*. The order of evolutionary advancement of the above A. I, II, III, IV B. I, IV, III, II C. II, III, IV, I D. IV, III, II, I

Use the diagram below to answer questions 8 and 9.



8. The angle between the parts labeled I and III is the A. bud B. node C. internode D. axil
9. The part of the plant where photosynthesis is least likely to take place is A. I B. II C. III D. IV
10. The stage in the life history of a moth responsible for the destruction of agricultural crops is the A. nymph B. mago C. pupa D. caterpillar
11. The blackfly is a vector of A. malaria B. trypanosomiasis C. onchocerciasis D. yellow fever
12. The transition from amphibians to mammals involves the limbs becoming arranged to support the weight more effectively requiring modifications in the A. collar bones and coccyx B. pectoral and pelvic girdles C. scapulae and clavicles D. vertebrae and sternum
13. The main function of the caudal fin in Tilapia is to A. propel it forward in water B. steer it while changing direction C. balance it in water D. enable it to float in water.
14. In the root vascular system, the stele is directly surrounded by the A. pericycle B. cortex C. endodermis D. parenchyma

Use the diagram below to answer questions 15 and 16.

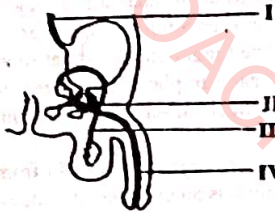


15. The part labeled IV represents the A. colon B. ileum C. caecum D. duodenum
16. The bile is stored in the part labeled A. I B. II C. III D. IV
17. The only vein that carries pure oxygenated blood is the A. renal vein B. pulmonary vein C. hepatic vein D. sciatic vein.
18. The function of the fluid-filled pericardium is to A. reduce the friction caused by the pumping movements of the heart B. supply the heart with oxygen and nutrients C. prevent disease organisms from attacking the heart D. reduce the intensity of the pumping action of the heart.
19. The mammalian lung is made airtight by the A. pleural cavity B. mucous membrane C. pleural membrane D. diaphragm.
20. A test tube containing yeast in glucose solution was suspended in a covered conical flask containing alkaline pyrogallol. The bubbles of carbon (IV) oxide produced indicate that the yeast cells are A. respiring in the absence of oxygen B. liberating oxygen on their own C. living and consuming oxygen. D. being killed by the alcohol produced.
21. The urinary tubules of the kidney function through A. osmosis and diffusion B. active transport and osmosis C. ultrafiltration and selective reabsorption D. active transport and cytoplasmic streaming.
22. Excess water in plants is excreted as water vapour and droplets respectively through A.

respiration and guttation B. transpiration and guttation C. photosynthesis and guttation D. guttation and condensation

23. When bacteria swim from cold to warm regions, this is known as A. negative chemotaxis B. positive thermotaxis C. positive hototaxis D. negative phototaxis
24. Hydrostatic skeleton is the type of supporting system found in A. mammals B. reptiles C. oligochaetes D. arthropods

Use the diagram below to answer questions 25 and 26.



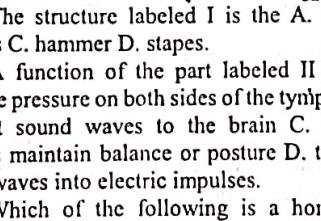
25. The structure labeled I originates from the A. liver B. kidney C. small intestine D. stomach
26. Birth control by vasectomy is achieved by severing the structure labeled. A. I B. II C. III D. IV

Use the diagram below to answer questions 27 and 28.



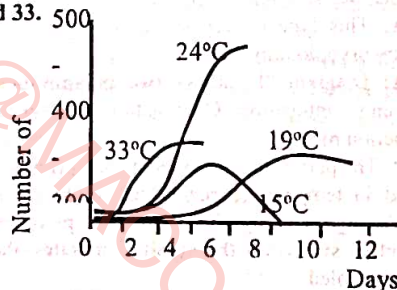
27. The main function of the structure labeled I is to A. store food for the young plant B. pull the young shoot above the ground. C. store water for the seedling D. protect the young plumule.
28. The type of germination illustration is termed A. hypogeal B. epicotyl C. epigeal D. hypocotyl

Use the diagram below to answer questions 29 and 30.



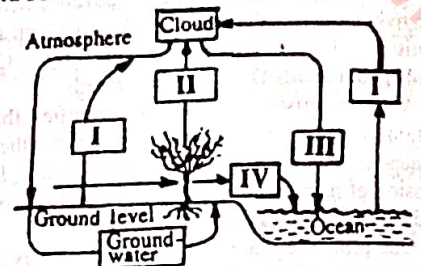
29. The structure labeled I is the A. incus B. malleus C. hammer D. stapes.
30. A function of the part labeled II is to A. equalize pressure on both sides of the tympanum B. conduct sound waves to the brain C. help the animals maintain balance or posture D. transform sound waves into electric impulses.
31. Which of the following is a homeostatic response in humans? A. Withdrawing the hand from a hot object. B. The mouth getting watery when food is sighted. C. Yawning owing to tiredness D. Shivering in a cold environment.

Use the diagram below to answer questions 32 and 33.



32. The optimal temperature for breeding cockroaches is A. 15°C B. 19°C C. 24°C D. 33°C
33. At which temperature will cockroaches not survive after 10 days? A. 15°C B. 19°C C. 24°C D. 33°C

Use the diagram below to answer questions 34 and 35.



34. Evaporation and transpiration are respectively represented by the components labeled V A. I and II B. II and III C. III and IV D. IV and I
35. The main reservoir of water in the cycle is the A. cloud B. groundwater C. plant D. ocean
36. The Mambilla plateau is a unique Nigeria blome located in A. Plateau State B. Bomb State C. Taraba State D. Benue State
37. In Nigeria, the Guinea savanna belt borders the A. mangrove swamps and the Sahel savanna B. rainforests and the Sudan savanna C. deserts and the Sudan savanna D. rainforests and the desert.
38. The population density of Tridax in an abandoned square farmland of side 200m was found to be 5 plants per m². The population size of the plant on the farm is A. 40 B. 1000 C. 40000 D. 200000
39. Secondary succession is much faster than primary succession because A. pioneer colonizers are more in number B. soil is already present C. secondary serves require less nutrients D. species competition is increased.
40. Which of the following is used to test for the presence of lime in a soil sample? A. H₂SO_{4(aq)} B. NaOH_(aq) C. HCl_(aq) D. HNO_{3(aq)}
41. The importance of practising crop rotation in agriculture is to A. maintain soil fertility B. improve the nutritional value of crops C. control soil erosion D. ensure the growth of crops.
42. The recycling method of solid waste disposal is unsuitable for A. organic matter B. glass C. plastics D. metal scraps
43. Anon-renewable alternative source of energy is A. wind generators B. solar panels. C. nuclear energy D. hydroelectric power
44. Which of the following is the best explanation for a child who is phenotypically short and born of two tall parents? A. The father possesses a gene for shortness B. The mother possesses a gene for shortness C. Nature makes the child short D. Both parents possess genes for shortness.
45. A yellow maize is crossed with a white maize and the first filial generation produce yellow maize only. The white trait is said to exhibit. A. dominance B. recessiveness C. co-dominance D. incomplete dominance
46. The association in which one member benefits and the other is relatively unaffected by the interaction is termed A. symbiosis B. parasitism C. commensalism D. mutualism
47. When a peacock displays its colourful feathers, it is A. ready for a fight B. protecting itself from predators C. protecting its mate from predators D. courting a female

48. When an animal has a dark-coloured dorsal surface and a light-coloured ventral surface, this is an adaptation called A. concealment coloration B. counter shading C. Colour blending D. disruptive coloration
49. The only caste in the termite colony whose members can feed themselves are the A. reproductive B. workers C. nymphs D. soldiers
50. An evidence of a common ancestry for fishes, amphibians, reptiles, birds and mammals is the A. possession of wings by bird and bats B. cold-bloodedness of fishes, amphibians and reptiles C. presence of gill clefts in vertebrate embryos D. possession of scales by fishes and reptiles.

U. M. E BIOLOGY 2005 SOLUTION

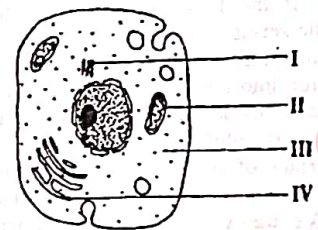
1. B: The cell membrane is common to both plant and animal cells. Note that the cell membrane is also known as the plasma membrane or plasma lemma.
2. A: The more active a cell is, the higher the concentration of mitochondria in it. Sperm cells are very active: They need to travel fast to fertilize egg. Hence, a sperm cell will have more mitochondria than other cells given.
3. D: The hyphal wall of fungi is rigid owing to the presence of chitin.
4. B: The division spermatophyte is divided into angiosperms and gymnosperms: Angiosperms are also sub-divided into monocotyledonous plants and dicotyledonous plants.
5. B: Coelenterates or Cnidarians are radially symmetrical. Hydra is an example.
6. D: The leech and earthworm belong to the annelids. Example of mollusc is snails; an example of crustaceans is crab; an example of arachnids is spider.
7. D: The order evolution in vertebrates is: Pisces → Amphibians → Reptiles → Aves → Mammals. *Rattus rattus* is a mammal, *Agama agama* is a reptile, *Bufo regularis* is an amphibian while *Tilapia zilli* is a pisces (fish). Thus, the trend will be: *tilapia zilli* → *Bufo regularis* → *Agama agama* → *Rattus rattus* i.e. IV → III → II → I
8. B: The node is the part of a stem where a leaf or bud grows.
9. D: The part labeled "IV" is the root. Photosynthesis is least likely to occur in the root since it is non-chlorophyllous.
10. D: The larva stage is the destructive stage of an insect. The larva stage of a moth is a caterpillar
11. C: The blackfly is a vector of Onchocerciasis *Onchocerca volvulus*. The disease is also known as river blindness.
12. B: The transition from amphibians to mammals involves the limbs becoming arranged to support the weight more effectively requiring modifications in the pectoral and pelvic girdles.
13. A: The major function of the caudal fin is to propel the fish forward in water i.e. the caudal fin is mainly responsible for forward motion.
14. A: The inner cylinder also known as the stele is surrounded by the pericycle.
15. D: The part labeled "IV" is the duodenum.
16. B: The part labeled "II" is the gall bladder. Bile is produced in the liver and stored in the gall bladder.
17. B: All arteries carry oxygenated blood except the pulmonary artery. Similarly, all veins carry de-oxygenated blood except the pulmonary vein. In other words, the pulmonary artery is the only artery that carries de-oxygenated blood while the pulmonary vein is the only vein that carries oxygenated blood.

18. A: The fluid-filled pericardium surrounding the heart serves a protective role. It reduces the friction caused by the pumping movement of the heart.
19. C: The pleural membrane, which surrounds the lungs, is an air tight sac.
20. A: Since the conical flask contains alkaline pyrogallol, oxygen is not available for oxidative respiration to occur. Why? Alkaline pyrogallol removes oxygen. Thus, the yeast must have respired anaerobically i.e. in the absence of oxygen.
21. C: The urinary tubules of the kidney function through ultrafiltration and selective reabsorption.
22. B: Excess water is usually lost from plants in form of water vapour in a process known as transpiration. Some plants can lose water as water droplets, this is known as guttation.
23. B: Taxis is the movement of a whole organism in response to external stimuli such as light, temperature, water or certain chemicals. When heat is the stimulus, it is called thermotaxis. The movement towards the source of heat is positive thermotaxis while the movement away from it is negative thermotaxis.
24. C: Oligochaetes possess hydrostatic skeleton. Anemones are other examples of organisms with hydrostatic skeleton. Generally, hydrostatic skeleton is associated with soft-bodied animals.
25. B: The structure labeled "I" is the ureter. The ureter conveys urine from the kidney to the urinary bladder.
26. C: Vasectomy is the cutting of the sperm duct as a form of birth control. The sperm duct is the structure labeled "III".
27. A: The part labeled "I" is the cotyledon. The major function of the cotyledon is to store food for the young plant.
28. C: Since the cotyledon is carried above the ground, the germination is epigeal. It would be hypogeal germination if the cotyledon remained under the ground.
29. D: The structure labeled "I" is the stapes (also known as stirrup). The bone is one of the three ear ossicles. The two others are malleus (or hammer) and incus (or anvil).
30. A: The part labeled "II" is the Eustachian tube; it equalizes the air pressure on both sides of the tympanum (ear drum).
31. D: Homeostasis refers to how an organism maintains a fairly constant internal environment.
32. C: The highest number of cockroaches is recorded at a temperature of 24°C. Hence, the optimal temperature for breeding cockroaches is 24°C.
33. A: At 15°C, the cockroaches will not survive after 10 days.
34. A: Water is lost from the group through evaporation and from the plants through transpiration.
35. D: The main reservoir of water in the cycle given is the ocean.
36. C: The Mambilla plateau is located in Taraba State.
37. B: The guinea savanna belt borders the tropical rainforest and the sudan savanna.
38. D: Population density = $5m^2$
Land area = $200m \times 200m = 40000m^2$
Population = Population density \times land area
= $5m^2 \times 200000$
39. B: Secondary succession is much faster than primary succession because soil is already present.
40. C: Hydrochloric acid (HCl) is used to test for the presence of lime in a soil sample.

41. A: The purpose is to maintain soil fertility.
42. A: It is only non-biodegradable materials that should be re-cycled. Biodegradable materials decompose naturally. Organic materials are biodegradable.
43. C: Nuclear energy is a non-renewable source of energy.
44. D: For two tall parents to give birth to a phenotypically short child, both the parents must be heterozygously tall i.e. they must have genes for shortness.
45. B: Since the yellow colour masked the white colour, yellow is said to be dominant while white is recessive.
46. C: An association in which one member benefits while the other neither benefits nor suffers harms is known as commensalism. An example is that between shark and remora fish.
47. D: The display of colourful feathers by a peacock is a courtship signal.
48. B: It is called countershading – a protective adaption.
49. B: The workers are the only termite caste that can feed themselves; other castes depend on them for food.
50. C: The possession of gill clefts by embryos is common to all vertebrates.

BIOLOGY U. M. E 2004

Use the diagram below to answer questions 1 and 2



1. The endoplasmic reticulum represented by the part labeled A. I B. II C. III D. IV
2. The part labeled II is responsible for A. photosynthesis B. respiration C. protein synthesis D. excretion
3. The rods in the retina of the eye are examples of A. cells B. Tissues C. organs D. Systems.
4. The absence of special food and water-conducting systems restricts the body size in. A. algae, liverworts and mosses B. liverworts, mosses and ferns C. the bryophytes and the pteridophytes D. the thallophytes and the pteridophytes
5. A plant-like feature in Euglena is the A. pellicle B. pigment spot C. large vacuole D. Gullet
6. The most common characteristic of the fungal hyphae is the possession of A. cell-like compartments with one nucleus each B. cell walls that are true are both rigid and chitinous C. a multicellular mycelium in strata D. cell-like partitions formed by cross-walls
7. Insects are considered the most successful among the invertebrates because they A. possess exoskeletons B. survive in various environmental conditions C. have wings for flight D. possess the ability to change their forms
8. The larval stage of a mosquito is called A. wriggler B. grub C. maggot D. Caterpillar
9. The function of the long-winged reproductive in a termite colony is to A. disperse the population. B. feed the young C. participate in swarming D. protect the young
10. A peculiar characteristic of mammals is that they A. have teeth B. are warm-blooded C. have lungs D. have sebaceous glands.

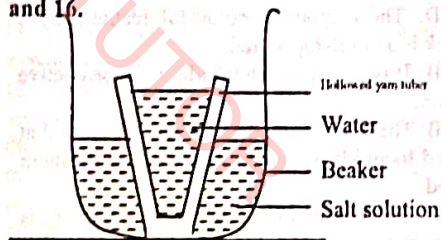
11. In the internal structure of plants, a wide pith in the centre is common to A. dicot stems and monocot stems B. dicot stems and monocot roots C. dicot roots and monocot roots D. dicot roots and monocot stems.

12. The gall bladder of a mammal has a duct connected to A. liver B. duodenum C. small intestine D. pancreas

13. All living cells require water because it A. is a medium for all metabolic reactions B. is a medium that neutralizes acids in cells C. is the main source of energy for the cells D. Prevents the development of diseases in cells.

14. The breakdown of fats and oils into simpler absorbable compounds is catalyzed by the group of enzymes called A. lipases B. hydrolases C. amylases D. peptidases.

Use the diagram below to answer questions 15 and 16.



15. Yam is used in this set-up because it A. is permeable to the salt solution B. is a plant material C. acts as a storage organ D. acts as a Semi-permeable membrane.

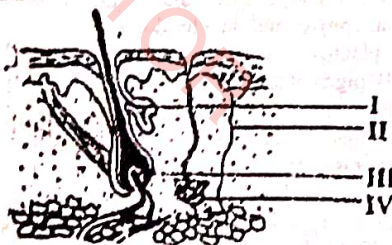
16. Which of the following results, is to be expected if the set-up is left for several hours? A. Decrease in the size of the yam B. Movement of the salt solution into the water C. Decrease in the volume of water inside the yam D. Movement of water from the salt solution into the yam

17. The surface of an alveolus in a mammal is well supplied with tiny blood vessels known as A. arterioles B. Venules C. arteries D. Capillaries.

18. The anaerobic fermentation of a glucose molecule yields. A. 38ATP molecules B. 2ATP molecules and alcohol C. Pyruvic acid and alcohol D. water and carbon (IV) oxide

19. The opening of the stomata is controlled by the A. presence of a pore B. increase in solute concentration in the guard cells C. presence of guard cells D. decrease in solute concentration in the guard cells.

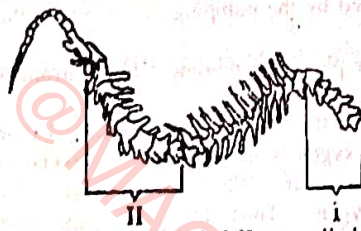
Use the diagram below to answer questions 20 and 21



20. The sweat gland is the structure labeled A. I B. II C. III D. IV

21. The function of the part labeled III is to A. contract to pull the hair erect B. conduct nervous impulses C. carry blood and nitrogenous waste D. produce oil for the skin.

Use the diagram below to answer questions 22 and 23.

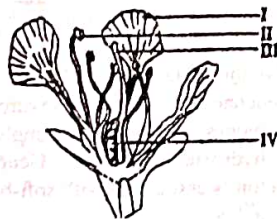


22. The bones labeled II are called A. cervical vertebrae B. sacral vertebrae C. thoracic vertebrae D. lumbar vertebrae

23. The type of joint between adjacent bones in the part labeled II is the A. ball-and-socket joint B. sliding joint C. hinge joint D. suture joint

24. The type of reproduction that is common to both Hydra and yeast is A. conjugation B. binary fission C grafting D Budding

Use the diagram below to answer questions 25 and 26.



25. The part labeled II is the A. style B. filament C. stigma D. anther

26. The process of pollination involves the transfer of pollens from A. I to II B. II to III C. III to IV D. IV to I

27. The eggs of birds contain relatively larger quantities of yolk than those of amphibians and reptiles because A. birds are generally bigger in size B. embryonic development is longer in birds C. those of birds are fertilized internally D. birds lay shelled eggs

28. Epigeal germination of a seed is characterized by A. more rapid elongation of the hypocotyl than the epicotyls B. more rapid elongation of the epicotyl than the hypocotyls C. equal growth rate of both the hypocotyl and epicotyls D. lack of growth of the hypocotyl.

29. Nervous control differs from hormonal control in that the former A. involves only chemical transmission B. is a slower process C. produces short-term changes D. has no specific pathway.

30. If a nursing mother is not producing enough milk, her hormonal system is probably deficient in A prolactin B. testosterone C. thyroxin D. Insulin

31. The two key cations involved in the action potential of nervous transmissions are A. Na^+ and Fe^{2+} B. Mg^{2+} and K^+ C. Na^+ and K^+ D. Fe^{2+} and Mg^{2+}

32. A caterpillar and an aphid living in different parts of the same plant can be said to A. Occupy the same ecological niche B. Be indifferent habitats C. Occupy different ecological niches. D. Be in similar micro habitats

Use the table below to answer questions 33 and 34

Ecological zone	Temperature ($^{\circ}\text{C}$)	rainfall (mm)
I	45	300
II	32	2000
III	30	2200
IV	15	800

33. High relative humidity will be expected in zones A. I and III B. I and IV C. II and III D. II and IV

34. Which of the zones is likely to be a desert? A. I B. II C. III D. IV

35. The association between termites and the cellulose-digesting protozoans in their guts is an example of A. Saprophytism B. Mutualism C. Parasitism D. Commensalism

36. The progressive loss of energy at each level in a food chain leads to A. an increase in biomass at each successive level B. a decrease in biomass at each successive level C. an increase in the number of organisms at each successive level D. an increase in the total weight of living matter at each successive level

37. One adaptation of reptiles to water loss is the presence of A. Keratinous scales B. Claws on limbs C. Long tails D. Long sticky tongues

38. A state in Nigeria that is most susceptible to desert encroachment is A. Kwara B. Taraba C. Kaduna D. Katsina

39. The Scarcity of food causes a sudden decrease in population size by A. decrease the reproductive rate B. bringing about immigration C. raising the mortality rate D. minimizing the rate of competition

40. The soil type that will be most difficult to plough in a wet season is one that is A. loamy B. clayey C. sandy D. silty

41. A farm practice that results in the loss of soil fertility is A. mixed farming B. Bush fallowing C. Shifting cultivation D. Continuous cropping

42. Paternity disputes can most accurately be resolved through the use of A. Finger printing B. Blood group typing C. DNA analysis D. tongue-rolling

43. In a mendelian cross of red and white varieties of the four O'clock plant, the F₂ generation expresses incomplete dominance by having flowers which are A. White B. Red C. Pink D. Multicoloured

44. Identical twins inherit their genes from A. Different eggs and sperms B. The same egg and sperm C. Two eggs and a sperm D. One egg and two sperms.

45. Sex-linked genes are located on A. Y-chromosome B. X- and Y- chromosomes C. homologous chromosomes D. X-chromosome.

46. Which of the following is an example of intraspecific competition? A. A lizard and an ant-cater chasing an insect. B. A worker termite and a soldier in a limited space C. A hawk and an eagle targeting the same chicken D. Yam and potato shoots growing out through the same window.

47. Plants survive hot dry conditions by A. Storing water in large parenchyma cells B. Producing numerous leaves C. Having numerous stomata D. Having evergreen leaves

48. Rodents gnaw food with their A. Molar teeth B. Strong jaw C. Flat- ridged teeth D. Chisel-like front teeth.

49. The spots and stripes of the leopard and tiger are example of A. Cryptic colouration B. Warning colouration C. Disruptive colouration D. Counter shading

50. An evidence of the relationship between living organisms and their extinct relatives can best be obtained from A. Embryology B. Comparative anatomy C. Comparative physiology D. Palaeontology

BIOLOGY U. M. E 2004 SOLUTION

1. D: The structure labeled "iv" is the endoplasmic reticulum. If ribosomes are present on its surface, the structure is known as rough endoplasmic reticulum. If, on the other hand,

ribosomes are absent, it is called smooth endoplasmic reticulum

2. B: The part labeled "j" is the mitochondrion. The mitochondrion is the power house of the cell - cellular respiration occurs here.

3. A: Rods are one of the two major photoreceptor cells in the retina, the other being cones. The rod cells are responsible for black and white vision while cone cells are responsible for colour vision.

4. A: Pteridophytes and spermatophytes possess good food and water-conducting system. Thallophytes and bryophytes lack food and water-conducting system; hence, their diminutive size. Don't forget that algae are thallophytes while liverworts and mosses are bryophytes.

5. C: Possession of large vacuole qualifies euglena as a plant. Other plant-like features of euglena are chloroplast and paramylum granule. The animal characteristics are:

- The possession of pellicle
- The possession of gullet
- The possession of flagellum and
- The possession of eye spot

6. C: Fungi are mainly multicellular. Fungi are composed of thin filaments called hyphae. The entire body of a typical multicellular fungus is composed of many hyphae tangled together to form what is known as mycelium.

7. B: Insects are able to adapt to many environmental conditions. This makes them the most successful group of invertebrates.

8. A: The larval stage of a mosquito is known as the wriggler; that of a beetle is known as grub, those of flies, bees and wasps are called maggots while those of butterflies and moths are known as caterpillars.

9. A: In a journey known as swarming, a large number of male and female long winged termite fly off their nests. During this journey, pairs of male and female isolate themselves, shed their wings and form a new colony at a suitable location. The purpose of this journey is to reduce overcrowding and also disperse the population.

10. D: The possession of teeth, lungs and being warm-blooded are not peculiar to mammals; the possession of sebaceous gland is. The sebaceous gland secretes sebum, an oily substance which makes the hair and the epidermis waterproof.

11. A: Both dicot stems and monocot roots possess wide pith at the centre

12. B: The gall bladder, which stores the bile, is connected to the duodenum via the bile duct. The duct transports bile from the gall bladder to the duodenum.

13. A: fats and oil are broken down into fatty acids and glycerol by enzymes known as lipases.

14. A: All living cells requires water because it serves as a medium for all metabolic reactions.

15. D: The experiment demonstrates osmosis. Yam, here is acting as a semi-permeable membrane.

16. C: Since salt solution is osmotically superior to water, water will move away from the yam into the salt solution.

17. D: The blood vessels that supply the surface of the alveoli are the capillaries.

18. B: Anerobic respiration produces CO_2 , ethanol and releases only 2ATP molecules

$\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_6\text{H}_5\text{OH} + 2\text{CO}_2 + 2\text{ATP}$. Aerobic respiration, on the other hand, produces CO_2 , H_2O and releases a whopping 38ATP molecules

$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + 38\text{ATP}$

19. B: When there is an increase in the solute concentration in the guard cells, the cells become osmotically turgid and the stoma opens. A decrease in the solute concentration causes water to flow from the guard cells into the surrounding epidermal cells, consequently causing the guard cells to become flaccid. As a result, the stoma closes. This is the description of how the guard cell controls the opening and closing of the stoma.

20. D: The structure labeled "IV" is the sweat gland.

21. C: The part labeled "III" is the blood vessel attached to the hair follicle; it carried blood and nitrogenous waste.

22. D: The part labeled "I" is the cervical vertebrae, the thoracic vertebrae. The part labeled "II" represents the lumbar vertebrae while the last two parts are sacral and vertebrae.

23. B: The joint between adjacent bones is known as sliding/gliding joint

24. D: Budding is common to both Hydra and Yeast. Budding is the formation of an outgrowth on the parent organism, which develops into a new organism.

25. D: "I" - Petal; "II" - Anther; "III" - Stigma; "IV" - Ovary

26. B: Pollination is the transfer of matured pollen grains from the anther of a flower to a suitable stigma.

27. B: It is because the embryonic development is longer in birds. I hope you do recall that the developing embryo feeds on the yolk.

28. A: In epigeal germination, the hypocotyls elongates more rapidly than the epicotyls, carrying the cotyledons above the soil.

29. C: Nervous control produces short term changes while hormonal control produces long term changes.

30. A: Prolactin is responsible for milk production in nursing mother.

31. C: Sodium ions (Na^+) and potassium ions (K^+) are the two key cations involved in the action potential of nervous transmissions.

32. C: The two organisms occupy the same habitat but different ecological niches. An ecological niche actually refers to the place occupied by an organism in a habitat and the role the organism performs there.

33. C: Humidity is the amount of moisture in the atmosphere. The higher the amount of rainfall, the higher the relative humidity and vice-versa.

34. A: A desert is characterized by low rainfall and high temperature.

35. B: The association is mutualistically beneficial. This is because the protozoans receives food and protection from the termite and they in turn, help the termite in cellulose digestion.

36. B: The loss of energy at each trophic level causes a reduction in the number and size of organisms.

37. A: The possession of scales on their skin helps reptiles to prevent water loss.

38. D: Katsina, Sokoto, Jigawa, Adamawa, Bauchi, Yobe etc. are prone to desert encroachment.

39. C: Food scarcity is sufficiently able to cause increase in death rate (mortality rate).

40. B: The sticky nature of clayey soil makes it difficult to plough in a wet season.

41. D: Continuous cropping is detrimental as it causes loss of soil fertility.

42. C: DNA analysis is the most accurate method for resolving paternity disputes.

43. C: Incomplete dominance refers to a condition of blending of character i.e. a situation whereby neither of the two characters is able to be dominant over the other totally. The incomplete dominance between red and white will produce pink.

44. B: Identical twins are produced from one egg and one sperm. The fertilized egg divides into two identical parts, which then develop into two separate but identical embryos.

45. D: Sex-linked characters are characters that are determined by a gene located only on the x-chromosome. Examples of such characters are haemophilia and colour blindness.

46. B: Inter-specific competition involves organisms of different species while intra-specific competition involves organisms of the same species since a worker termite and a soldier termite are both termites, the competition between them is intra-specific.

47. A: Possession of reduced leaves, small number of stomata and storage of water in the parenchyma cells are all adaptations for water conservation.

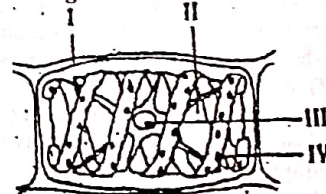
48. D: Rodents gnaw on food with their chisel-like front teeth

49. C: Disruptive colouration refers to the patterns on the body of animals which break up their familiar shapes against the light and dark shades of their background. It enables them to go undetected. A typical example is the presence of stripes and spots on the bodies of leopards and tigers.

50. D: The evidence of the relationship between living organisms and their extinct relatives can be obtained by palaeontology. Palaeontology refers to the study of remains of organisms usually found in rocks.

BIOLOGY U. M. E. 2003

1. In the egg of a bird, the embryo is located in the A. chalaza B. Yolk C. albumen D. embryo. Use the diagram below to answer questions 2 and 3



2. The structures that are common to both plant and animal cell are labeled A. IV and I B. III and IV C. II and III D. I and II
3. Food is stored in the structure labeled A. III B. I C. IV D. II
4. One distinctive feature in the life history of liverworts is that they exhibit A. alternation of generation B. vegetative reproduction C. A sexual reproduction D. sexual reproduction

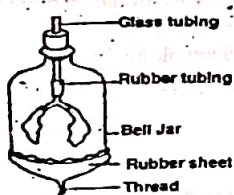
Use the diagram below to answer questions 5 and 6



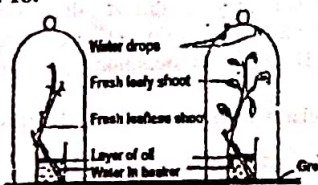
5. A noticeable adaptation of the animal to its aquatic habitat is the possession of A. a wide mouth B. large eyes C. webbed digits D. four limb

6. The processes of water loss and arid intake indicated by the arrows labeled I and II are respectively A. exhalation and osmosis B. Urination and diffusion C. osmosis and diffusion D. evaporation and osmosis
7. The umbrella-shaped fruiting body of a fully developed mushroom is the A. pileus B. Mycelium C. basidium D. Stipe
8. The similarity among organisms belonging to the same group will be least within each A. family B. Order C. kingdom D. species
9. Hermaphroditic reproduction can be found among the A. arthropods and nematodes B. pisces and amphibians C. annelids and mollusks D. coelenterates and platyhelminthes
10. An insect whose economic importance is both harmful and beneficial is the A. tsetsefly B. blackfly C. mosquito D. butterfly
11. The cell component that present in a prokaryotic cell is the A. chloroplast B. ribosome C. mitochondrion D. nuclear envelope
12. The stunted growth of a leguminous plant suffering from nitrogen deficiency may be corrected by inoculating the soil with A. denitrifying bacteria B. saprophytic bacteria C. rhizobium D. nitrosomonas.
13. If water that has been coloured red is poured at the base of a wilting plant, it will appear as a red stain in the cells of A. xylem B. epidermis C. phloem D. parench

Use the diagram below to answer questions 14 and 15.

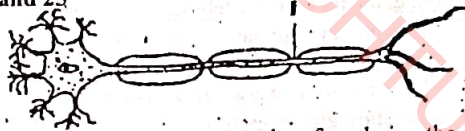


14. The aim of the experiment is to demonstrate A. that in mammals gaseous exchange takes place in the lungs B. the part played by the pleural cavity and diaphragm in respiration C. that a large amount of oxygen is absorbed by the lungs D. that presence of carbon (IV) oxide in exhaled air
15. In the experimental set-up, the rubber sheet represents the organ called A. pleural cavity B. lungs C. diaphragm D. intercostal muscle
16. The dark reaction of photosynthesis involves the A. reduction of carbon (IV) oxide to organic compounds B. release of oxygen and the splitting of water C. photolysis of water and the production of starch D. splitting of water into hydrogen ions.
- Use the diagram below to answer questions 17 and 18.



17. The experiment is used to demonstrate that A. plants lose water through guttation B. transpiration occurs through the leaves C. water is necessary for photosynthesis D. leaves are important to photosynthesis
18. In the experiment, the layer of oil serves to prevent water loss by A. transpiration B. Evaporation-C. osmosis D. Guttation.
19. Organisms I, II, III, and IV have surface volume ratios of 1:2, 1:3, 1:4, 1:5, respectively.

- The organism that is likely to have the most complex transport system is A. IV B. III C. I D. II
20. The part of the mammalian digestive system where absorption of nutrients takes place is the A. ileum B. colon C. oesophagus D. duodenum
21. The best method of propagating sugarcane is by A. seed sowing B. layering C. grafting D. stem cuttings
22. In mammalian males, the excretory and reproductive systems share the A. ureter B. vasdeferens C. urethra D. Testes.
23. Metabolic production of urea is carried out in the A. Urinary bladder and kidney B. liver C. pancreas D. kidney and malphigian tubule
- Use the diagram below to answer questions 24 and 25



24. The structure can be found in the A. sympathetic and parasympathetic nervous systems B. peripheral and central nervous systems C. peripheral nervous system only D. central nervous system only.
25. The point marked I is referred to as A. myelin sheath B. dendrites C. axon D. node of Ranvier
26. Homologous pairs of chromosomes separate during A. cytolyis B. Cleavage C. mitosis D. Meiosis
27. An example of a caryopsis A. guava B. maize grain C. coconut D. Tomato
28. The response of plants to external stimuli in a non direction al manner is known as A. tactic movement B. phototropism C. geotropism D. nastic movement
29. The most important hormone that induces the ripening of fruit is A. ethylene B. indole acetic acid C. gibberellins D. cytokinin
30. A density - dependent factor that regulates the population size of organism is A. disease B sudden flood C. drought D. fire outbreak
31. One example of fossil fuels is A. limestone B. coral C. coal D. firewood.
32. The most effective method of dealing with non-biodegradable pollutants is by A. dumping B. recycling C. incineration D. Burying
33. The correct sequence of biomes from northern to southern Nigeria is A. guinea savanna → sudan savanna → tropical rain forest → sahel savanna → estuarine B. estuarine → tropical rain forest → guinea savanna → sahel savanna C. sahel savanna → tropical → rain forest → estuarine → guinea savanna D. sahel savanna → sudan savanna → guinea savanna → tropical rain forest → estuarine
34. Mycorrhiza is an association between fungi and A. protozoans B. roots of higher plants C. bacteria D. filamentous algae
35. A limiting factor in a plant population near a chemical factory is likely to be A. light B. humidity C. wind D. pH.
36. Soil fertility can best be conserved and renewed by the activities of A. earthworms B. man C. rodents D. Microbes.
37. The pioneer organisms in ecological succession are usually the A. mosses B. lichens C. ferns D. Algae
38. If a DNA strand has a base sequence TCA, its complementary strand must be A. ATG B. TAG C. GAT D. AGT
39. A man and his wife are both heterozygous for the sickle - cell trait. The likely percentage of their

- offspring that will be either carriers or 'sicklers' is A. 75% B. 50% C. 25% D. 100%
40. If the pair of alleles for baldness is given as Bb, a female carrier will be denoted by A. X^bY B. X^BX^b C. X^BY D. X^BX^B
41. An organism that has been extensively used to test the chromosome theory of heredity is A. Drosophila melanogaster B. musca domestic C. Zeamays D. homo sapiens
42. A feature associated with the V-chromosome in humans is A. long eyelashes B. prominent fingernails C. facial hairs D. enlarged breast.
43. The type of reproduction that leads to variation in animal and plant populations is A. budding B. sexual C. vegetative D. asexual
44. An insect with a mandibulate mouth part will obtain its food by A. biting and chewing B. chewing and sucking C. chewing D. Sucking
45. An argument against Lamarck's theory of evolution is that A. disuse of body part cannot weaken the part B. disused part is dropped off in the offspring C. acquired traits cannot be passed onto the offspring D. traits cannot be acquired through constant use of body parts.
46. The presence of sunken stomata and the folding of leaves are adaptations to A. prevent entry of pathogens B. reduce water loss C. remove excess water D. prevent guttation
47. Spines and shells on animals are adaptations for A. camouflage B. chemical defence C. physical defence D. mimicry
48. An example of cryptic colouration is the A. mottled colours on moths that rest on lichens B. bright colour of an insect-pollinated flower C. green colour of a plant D. bright marks on a poisonous tropical frog on variegated leaves.
49. Which of the following requires the use of carbon dating to prove that evolution has occurred? A. comparative anatomy B. biochemical similarities C. molecular records; D. fossil records.
50. The inactive state exhibited by an animal during hot dry seasons is termed A. aestivation B. Dormancy C. resting D. Hibernation

BIOLOGY U. M. E. 2003 SOLUTION

1. B: In the egg of a bird, the embryo is located in the yolk. This is necessary since the embryo obtains its food from the yolk.
2. C: The structure labeled 'ii' is the cytoplasm while 'iii' represents the nucleus. Both plant and animal cells possess cytoplasm and nucleus.
3. C: The structure labeled 'iv' is the pyrenoid. Food is stored in the prenoid.
4. A - Bryophytes (e.g. mosses and liverworts) and Pteridophytes (e.g. ferns) are known for alternation of generation.
5. C: Toads and frogs possess long hind limbs with webbed digits which are adapted for swimming.
6. D: Since amphibians exhibit cutaneous respiration (alongside with buccal respiration and pulmonary respiration), the process of water loss required can be exhalation (where CO₂ and H₂O are given off). Also, it can be evaporation from the skin into the atmosphere. Since its body fluid is osmotically superior to water, water can enter the organism's body through osmosis.
7. A: The umbrella-shaped fruiting body of a fully developed mushroom is known as pileus or cap. The stem-like part is known as stipe.
8. C: Kingdom is the most diversified taxon while species is the least. Thus, the kingdom will constitute organisms that are least similar while the

species will contain organisms that are most similar.

9. C: Majority of Annelids are hermaphrodites; some mollusks are also hermaphroditic.

10. D: The butterfly is both beneficial and detrimental in its dealings. The butterfly is a good agent of pollination; however, its larva is a good crop pest.

11. B: Prokaryotic cells lack nuclei. They also lack membrane-bounded organelles such as mitochondria, endoplasmic reticulum and the vacuole. Ribosomes are present in prokaryotic cells (but similar than those in eukaryotic cells).

12. C: Rhizobium is a nitrogen-fixing bacterium. It lives in the root nodules of leguminous plants.

13. A: The red stain will be seen in the cells of xylem since it is responsible for the transport of water and mineral salts.

14. A: The aim of the experiment is to demonstrate that gaseous exchange takes place in the mammalian lung.

15. C: The rubber sheet represents the diaphragm; the two balloons represent the lungs while the inverted Y-shaped tube represents the trachea and the bronchi.

16. A: Splitting of water into hydrogen ions and hydroxide ions occurs during the light reaction. The dark reaction involves the reduction of carbon (iv) oxide to organic compounds.

17. B: As can be seen, the set-up containing leafy shoot has water vapour while the set-up with leafless shoot doesn't. This demonstrates that transpiration occurs through the leaves.

18. B: The layer of oil over the water is to prevent water loss by evaporation.

19. A: A small surface area to volume ratio makes diffusion an inefficient method of transport. Large surface area to volume ratio will enable the organism to be able to make do with simple diffusion.

20. A: Absorption of nutrients occurs in the ileum. The actual site is the villi. The villi of the small intestine has a large surface area and it is well vascularised; all this enhances easy absorption.

21. D: The best method of propagating sugarcane is by stem cuttings.

22. C: The urethra is urinogenital in function. Both urine and sperm pass through it. It must be noted that this is only so for mammalian male.

NB: Don't confuse the urethra with the ureter; the ureter is the vessel that transports urine from the kidney to the bladder.

23. B: The metabolic production of urea is carried out in the liver. The liver breaks down protein and removes the toxic ammonium ions by converting it to urea.

24. B: The structure is a neurone. Neurons are found in both the central nervous system and the peripheral nervous system.

25. D: The part labeled 'I' represents the 'node of Ranvier'.

26. D: The separation of homologous pairs of chromosomes occurs during the anaphase stage of the first meiotic division.

27. B: A maize grain is an example of caryopsis.

28. D: Tropism and taxis are directional while nastism is non-directional.

29. A: Ethylene (also known as ethene) is the chief plant substance that induces the ripening of fruit.

30. A: Disease is a density-dependent factor that regulates population size of organisms.

31. C: Coal is a good example of fossil fuels.

32. B: Biodegradable materials are those materials that can be broken down into simple harmless forms by the action of microorganisms; non-biodegradable materials are those that cannot be so broken down.

33. D: The correct sequence is: Sahel savanna → Sudan savanna → Guinea savanna → Tropical rainforest → Estuarine.

34. B: Mycorrhiza is a mutualistic/symbiotic association between fungi and roots of higher plants. The plants supply nutrient to the fungi while the fungi, in return, help the plants to absorb water from the soil.

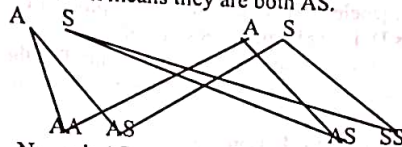
35. D: Plant population near a chemical factory is likely to be limited as the chemicals discharged affect the pH of the soil.

36. D: The activities of microbes conserve and renew the soil fertility.

37. B: The pioneer organisms in ecological succession are usually the lichens.

38. D: In a DNA strand, guanine pairs with cytosine while thymine pairs with adenine.

39. A: The two being heterozygous for the sickle-cell trait means they are both AS.



AA - Normal; AS - Carrier; SS - Sickler. Thus, of the four offspring, three are either carrier or sickler.

Therefore, the percentage of either sickler or carrier = $\frac{3}{4} \times 100\% = 75\%$

40. D: XX is for female while XY is for male. A male can either be normal or a sufferer (of any sex-linked disorder). If the pair of alleles for baldness is given as Bb; a female carrier will be denoted by X^BX^b.

41. A: The organism that has been extensively used to test the chromosome theory of heredity is drosophila melanogaster (fruit fly).

42. C: Possession of facial hairs is peculiar to human males. Thus, we can say the feature is associated with the Y-chromosome.

43. B: Sexual reproduction leads to variation in plant and animal population.

44. A: Since mandibles are jaw-like structures used for cutting and crushing, an insect with a mandibulate mouth part will obtain its food by biting and chewing.

45. C: Acquired traits cannot be passed on the offspring.

46. B: Sunken stomata and folded leaves reduce water loss.

47. C: Spines and shells on animals are adaptations for physical defence.

48. A: Cryptic colouration is a feature that allows an organism to avoid detection by other organisms. This may be an adaption to escape predation or to enable the organism prey on another organism.

49. D: Radiocarbon dating is employed to estimate the age of fossil deposits.

50. A: The inactive state exhibited by an animal during hot dry seasons is known as aestivation. Hibernation occurs during the winter.

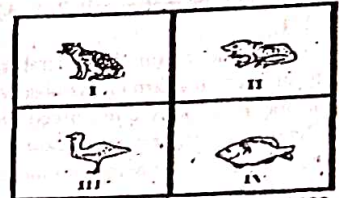
BIOLOGY U. M. E. 2002 Question Paper type: Z

1. The animals that move by means of flagella include A. Paramecium and planaria B. Amoeba

and hydra C. Planana and Amoeba D. Chlamydomonas and euglena

2. When oil is poured into the breeding site of mosquitoes it A. slows down egg development B. deprives the larvae of water C. kills the adult D. suffocates the pupae

Use the diagrams below the answer questions 3 and 4



3. The correct evolutionary sequence of the organisms represented is A. III → II → I → IV B. IV → II → III → I C. II → III → IV → I D. I → III → II → IV

4. Oviviparity is the type of fertilization exhibited by the organism labeled A. III B. IV C. I D. II

5. In corns, food is usually stored in the A. Stems B. Buds C. Leaves D. Roots

6. The structures found only in plant cells are A. chromatin and nucleolus B. cell membrane and cytoplasm C. cell membrane and lysosome D. cell wall and chloroplast

7. A flower that has both stamens and pistil is said to be A. imperfect B. Perfect C. staminate D. Pistillate

8. An Amoeba and an unlaidd chicken egg are A. organisms B. single cells C. organelles D. animals tissues

9. In his theory of evolution, Darwin implied that A. the most successful organisms are those that best adapt to their environment B. any traits acquired by an organism during its lifetime can be passed onto its offspring C. The struggle for existence among living organisms is sporadic D. organs of the body which are not regularly used by an organism will disappear.

10. Birds which are large with long straight pointed beaks, long necks and long legs are likely to be A. fish catchers B. nectar feeders C. fruit eaters D. insect eaters

11. Animals aestivate when the environment in which they live becomes A. cold and wet B. warm and humid C. windy and snowy D. hot and dry

12. The structure that is common in the embryos of mammals, amphibians, birds, fishes and reptiles and which is an evidence of their common ancestry is the A. gill-slits. B. Eye C. chorion D. Allantois

13. The carnassial teeth of a carnivorous animal consist of the A. first upper premolar and the first lower molar B. last upper premolar and the first lower molar C. first upper molar and the first lower molar D. last upper molar and the last lower molar

14. A feature of the caste systems of bees and termites is that A. the kings are bigger than the queens B. the workers are sterile C. nuptial fight is performed by all members D. only the workers perform duties

15. In a population of living things, the parameters of size, height, weight and colours are examples of A. physiological variations B. non-heritable variations C. discontinuous variations D. continuous variations

16. If XN is the dominant allele for normal vision and X the recessive allele for colour-blindness, a boy with the genotype YX will A. be colour-blind B. be a carrier of colour-blindness C. have normal vision D. be totally blind

17. The first four children of a couple were all girls. The probability that the fifth will also be a girl is A. $1/3$ B. $1/2$ C. $1/5$ D. $1/4$

18. Genetic counselling is important when a marriage is planned between a A. Rh⁻ woman and Rh⁺ man B. Rh⁻ woman and Rh⁺ man C. Rh⁺ woman and Rh⁺ man D. Rh⁺ woman and Rh⁺ man

19. What proportion of the offspring of a cross between two heterozygous parent will exhibit the recessive condition phenotypically? A. $4/4$ B. $3/4$ C. $1/2$ D. $1/4$

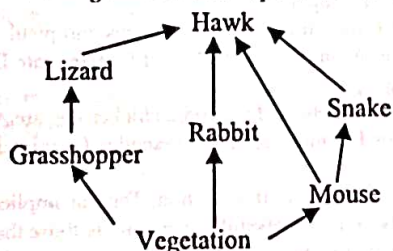
20. To select and retain the desirable trait of large body size which a farmer has observed in his herd, the farmer needs to A. cross-breed his animals with a different herd B. prevent disease in his herd C. feed the animals in the herd with more food D. in breed the animals in his herd.

21. Plants tend to prevent overcrowding by means of efficient A. pollination B. seed dispersal C. seed germination D. water uptake

22. The community of plants in which the same species occur from year to year is the A. perennial species B. annual species C. climax vegetation D. pioneer vegetation

23. The-supporting tissue of xylem is most poorly developed in A. grassland plants B. desert plants C. mangrove swamp plants D. submerged water plants

Use the diagram to answer questions 24 and 25



24. Example of competitors are A. rabbit and snake B. grasshopper and mouse C. lizard and mouse D. snake and lizard

25. In the diagram, the hawk is A. a tertiary consumer B. a scavenger C. a primary consumer D. an omnivore

26. In a population study using the transect method, a student is likely to record the highest number of species in A. a guinea savanna B. a sahel savanna C. an estuarine swamp D. a tropical rain forest.

27. The most common means of transmitting the Acquired immune deficiency syndrome (AIDS) is A. through sexual intercourse B. from mother to child C. through the sharing of needles D. through blood transfusion

28. A step in the movement of energy through an ecosystem is a description that best fits the term A. trophic level B. food web C. food chain D. pyramid of numbers

29. In a field experiment, the frequency of water leaf was observed to be 48 after 20 tosses of a $2m^2$ quadrat. What is the density of the plant in the field? A. $4.8perm^2$ B. $9.6perm^2$ C. $1.2perm^2$ D. $2.4perm^2$

30. The excessive use of agro-chemical could lead to the pollution of A. space B. the lithosphere C. the atmosphere D. fresh water

31. The physical and climatic factors of a region primarily determine the A. nature of the soil in that region B. kinds of animals inhabiting the area C. community of organisms in the region D. types of plants found in the area

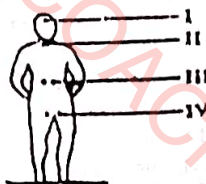
32. The addition of lime to clayey soil serves to A. improve capillary action B. prevent water-logging C. close up the texture D. aid water retention

33. One of the adaptations to life on trees by a monkey is its possession of digits which are A. long B. Opposable C. extensible D. big

34. A person that is obese must avoid meals containing A. beef and beans B. Carrots and oranges C. rice and yam D. margarine and butter.

35. The organ located within the duodenal loop in the mammal is the A. pancreas B. Liver C. gallbladder D. Spleen.

Use the diagram below to answer questions 36 and 37

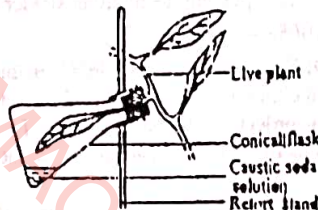


36. The gland usually found in the position labeled I is the. pituitary B. Pancreatic C. adrenal D. thyroid

37. A hormone secreted at IV serves to A. raise the level of calcium ions in the blood B. make the body react to emergencies C. Facilitate the development of facial hairs D. lower blood glucose level

38. Tissue respiration is important for the A. release of carbon (IV) oxide into the lungs B. release of energy for body use C. exhalation of carbon (IV) oxide from the lungs D. absorption of oxygen into the alveoli.

Use the diagram above to answer question 39 and 40



39. Which of the following statements is correct about the experiment? A. The enclosed leaf will lose its green colour B. The flask must be of the conical type. C. The leaves outside the flask serves as control D. caustic soda be replaced with distilled water.

40. The experimental set-up can be used to demonstrate that A. photosynthesis occur in the leaves of plants B. carbon (IV) oxide is necessary for photosynthesis C. oxygen is necessary for photosynthesis D. light is necessary for photosynthesis.

41. In which of the following groups of fruit is the pericarp inseparable from the seed coat? A. caryopsis B. Nut C. follicle D. Cypsela

42. The mammalian erythrocytes differ from the leucocytes at maturity because the leucocytes are A. amoeboid and enucleated B. discoid and nucleated C. discoid and enucleated D. amoeboid and nucleated

43. Examples of organisms in which extracellular digestion occurs are A. roundworm, tapeworm and hydra B. Rhizopus, housefly and Hydra C. Rhizopus, sponges and earthworm D. Fungus, Loranthus and housefly

44. When a marine fish was taken from the ocean and put in a tank of fish water, it died after a short period because A. the body cells of the fish shrank as their sap was hypertonic to the fresh water B. there was no food in the tank, so the fish starved C. the tank was too small compared to the large ocean D. the body cells of the fish swelled and burst as a result of the hypotonic fresh water.

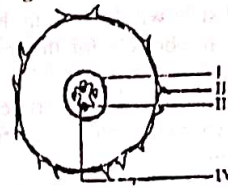
45. The mode of nutrition exhibited by a tapeworm is A. saprophytic B. symbiotic C. holozoic D. Parasitic

46. The presence of endoskeleton is characteristic of A. vertebrata B. Coelenterata C. Invertebrata D. Insecta

47. Which of the following pairs of organs is located in the anterior half of the mammalian body cavity? A. Lungs and heart B. Kidneys and heart C. Heart and ovary D. kidney slungs.

48. The capture and digestion of insects by a pitcher plant is a special form of nutrition termed A. chemosynthetic B. saprophytic C. heterotrophic D. autotrophic

Use the diagram below to answer questions 49 and 50



49. The structure labeled I represents the A. cortex B. Phloem C. pericycle D. Xylem

50. The function of absorption is performed by the structure labeled A. IV B. III C. II D. I

BIOLOGY U. M. E. 2002 SOLUTION

Question Paper type: Z

1. D: The animals that move by means of flagella include Chlamydomans and Euglena. Paramecium moves by cilia while Amoeba moves by its pseudopodium.

2. D: Pouring oil into the breeding site of mosquitoes is one of the available ways for curbing malaria. The oil suffocates the pupae of the insect.

3. B: 'i' - Cat (a mammal), 'ii' - Toad (an amphibian), 'iii' - Bird (an ave), 'iv' - Fish (a Pisces). The evolutionary trend among the vertebrates is: Pisces → Amphibians → Reptiles → Ave → Mammals. Thus, the correct sequence is: iv → ii → iii → i.

4. C: Oviviparous animals are those animals that develop within eggs that remain with the mother's body until they are hatched. Don't forget that oviparity means laying of eggs while viviparity means giving birth to young ones alive. Hence, it is clear that ovoviviparity is somewhere between oviparity and viviparity. Examples of animals that exhibit ovoviviparity are sharks, sea horses, reptiles and some mammals.

5. A: In corms, food is usually stored in the stems.

6. D: Cell wall and chloroplast are peculiar to plant cells as they are absent in animal cells.

7. B: A perfect flower is one that has all the essential parts. The essential parts of a flower are the reproductive parts i.e. stamens and pistil. A flower that has only stamens is said to be staminate while the one that has only pistil is said to be pistillate.

8. B: An Amoeba and unlaidd chicken eggs are single cells.

9. A: The implication of Darwin's theory of evolution is that the most successful organisms are those that are best adapted to their environment.

10. B: A bird with the described features is likely to feed on nectar.

11. D: Aestivation is an adaptation to survive hot and dry conditions. Hibernation occurs during the winter.

12. A: The embryos of all vertebrates (Pisces, Amphibians, Reptiles, Aves and Mammals)

possess gill-slits. This is an evidence for their common ancestry.

13. B: The carnassial teeth, which is peculiar to carnivorous animals comprises the last upper premolar and the first lower molar.

14. B: *The queens are bigger than the kings

- The workers are sterile.
- Nuptial flight is performed by the winged reproductive.

- All members are assigned to duties – some are workers, some are the reproductive while others are soldiers.

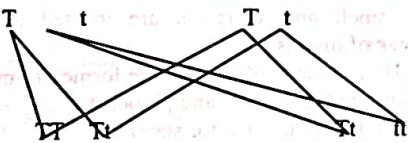
15. D: Size, height, weight and colours are examples of continuous variations. Be reminded that continuous variations are those characteristics that vary from one extreme end to the others.

16. A: Colour-Blindness is a sex-linked trait; and as we know male animals can never be carrier of any sex linked trait – it is either they are normal or they suffer the abnormality. Since a sex-linked trait is usually located on the x-chromosome, a female can only suffer the abnormality if both x-chromosomes are defective.

17. B: Even if the first ten children are girls, the probability that the next child will be a girl is still $\frac{1}{2}$.

18. B: A Rh⁺ woman can get married to a Rh⁻ man with no complication associated. Caution must be taken in the case of Rh⁻ woman and Rh⁺ man! The diffusion of Rh⁺ factor into the foetal blood can be fatal.

19. D:



Of the four outcomes, only tt denotes the offspring exhibiting the recessive condition phenotypically. Thus, the proportion of children with such occurrence = $\frac{1}{4}$.

20. D: In order to retain the desired characteristics already observed in his herd, the farmer will need to inbreed the animals in his herd.

21. B: Efficient seed dispersal is clearly an adaptation for preventing overcrowding.

22. C: The climax community is the community in which the same species of organisms occur from year to year

23. D: Since xylem is for the transport of water, a plant that is submerged in water already will not need a complex xylem.

24. B: In the food web given, both grasshopper and mouse feed on the vegetation. Hence, they are competitors.

25. A: Since the hawk feeds on lizard and snake which are secondary consumers, the hawk is a tertiary consumer.

26. D: The tropical rainforest has the highest number of species.

27. A: Although Acquired Immune Deficiency Syndrome (AIDS) can be transmitted in many ways, the most common means is through sexual intercourse.

28. A: Each step in the movement of energy through an ecosystem is known as a trophic level. This is because energy is transferred from one trophic level to another.

29. C: Density = $\frac{\text{Number of plants per toss}}{\text{Area of quadrat}}$

Number of plants per toss = $\frac{\text{Number of Plants}}{\text{Number of tosses}}$

= $\frac{48}{20} = 2.4$

Area of quadrat = 2m^2

Density = $\frac{2.4}{2\text{m}^2} = 1.2/\text{m}^2$.

30. D: Excess agro-chemical, if washed into the water, constitutes water pollution.

31. C: The physical and climatic factors of a region primarily determine the type of organisms found in the region.

32. B: Lime really modifies the soil properties. It improves clay soil by causing the clay particles to group together into larger units. This improves the aeration and drainage of the clay.

33. B: Possession of opposable digits is an adaptation of a monkey to its arboreal habitat.

34. D: An obese person must avoid food that contains high amount of fat e.g. margarine and butter.

35. A: The pancreas is located within the duodenal loop in a mammalian organism.

36. A: The gland that is located in the head region is the pituitary gland. The pituitary gland is also known as the master gland because it controls the activities of other glands.

37. C: Position 'iv' is the genital region of a man. The hormone produced in the testes is known as the testosterone. The testosterone is responsible for the development of male characteristics.

38. B: Tissue respiration serves the major role of energy production.

39. C: The leaf in the flask will not be able to photosynthesize while the ones outside the flask will. This is because the caustic soda in the flask removes all the available CO₂ while the leaves outside the flask still has its own supply of CO₂. Thus, leaves outside the flask serve as the control.

40. B: As iterated earlier, the experiment is used to demonstrate that carbon (iv) oxide is necessary for photosynthesis.

41. A: In caryopsis, the pericarp and seed coat are fused to form a single cover over the seed.

42. D: The erythrocytes do not have nuclei i.e. they are anucleated. They are also discoid in shape. Leucocytes, on the other hand, are amoeboid in shape and also have nuclei i.e. are nucleated.

43. B: Rhizopus, housefly and hydra exhibit extracellular digestion.

44. D: An ocean has a greater salt concentration than the fresh water. Thus, the marine fish will have a body fluid that is hypertonic to the freshwater (the water is hypotonic to it). Water then flows into the fish osmotically and eventually, the fish bursts.

45. D: A tapeworm is a parasitic organism. This platyhelminth is a parasite of man, pig and cow. There are two types of tapeworms: *Taenia solium* and *Taenia saginata*.

46. A: Vertebrates have their skeleton inside their body i.e. they possess endoskeleton.

47. A: The anterior half of the body is the upper half while the posterior half is the lower half. Both the lungs and the heart are located in the anterior half.

48. C: The carnivorous feeding exhibited by some plants such as sundew, butterwort, bladderwort venus flytrap, pitcher plant etc. is a form of heterotrophic nutrition. Let's come to think of it; it is not as if those plants do not photosynthesize (which should have qualified them as being autotrophic), but they also trap and digest insects in order to obtain nitrogenous compounds).

49. C: The part labeled 'i' is the pericycle. The pericycle surrounds the internal cylinder.

50. C: The part labeled 'ii' is the root hair. The root hair is responsible for the absorption of water and mineral salts from the soil.

BIOLOGY U. M. E. 2001, April 28th

Question Paper type: U

1. Water fleas, wood lice and barnacles belong to the group A. insecta B. Chilopoda C. crustacea D. Arachnida

2. Which of the following organisms does not exist as a single free living cell? A. Volvox B. Amoeba C. Chlamydomonas D. Paramecium

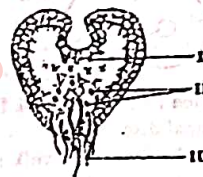
3. An association between the root nodule of a leguminous plant and Rhizobium sp. is known as A. parasitism B. Symbiosis C. commensalism D. Mycorrhiza

4. Which of the following groups is the most advanced? A. Thallophytes B. Pteridophytes C. Gymnosperms D. Bryophytes

5. The mode of feeding in Amoeba and Hydras A. autotrophic B. Heterotrophic C. symbiotic D. Holophytic

6. Viviparity occurs mainly in the A. Aves B. Amphibians C. mammals D Reptiles

Use the diagram below to answer questions 7 and 8



7. In the ferns, the structure above is equivalent to the A. gametophyte generation of a moss B. sporophyte generation of a moss C. sporangium of a moss D. zygote of a moss

8. The structures labeled I and II respectively are A. sporophyte and son B. annulus and stalk of sporangium C. female organs and rhizoid D. male organs and rhizoid

9. Most monocots are easily recognized by their A. long and sword-like leaves B. long and palm-like leaves C. short leaves with petioles D. short leaves with many veinlets.

10. Amphibians are normally found A. in water B. on moist land C. in water and on moist land D. on dry land and in water

11. The jointed structure in insects that bears organs which are sensitive to touch, smell and vibration is the A. antenna B. abdomen C. maxilla D. Labium

12. The veins of the leaf are formed by the A. spongy mesophyll B. palisade tissue C. cambium cells D. vascular bundles.

13. When specimen X is mixed with few drops of iodine solution, the appearance of a blue-black colour confirms X is A. sucrose B. Glucose C. starch D. Galactose

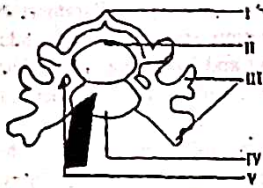
14. The enzyme invertase will hydrolyse sucrose to give A. mannose and galactose B. glucose and fructose C. maltose and glucose D. glycerol and fatty acid.

15. Salt and water are absorbed in the roots and transported to the leaves by A. osmosis through the phloem tissues B. diffusion through the phloem tissues C. osmosis through the xylem tissues D. diffusion through the xylem tissues

16. The transportation of oxygen and carbon (iv)oxide in mammals is carried out by A. phagocytes B. Leucocytes C. erythrocytes D. Thrombocytes.

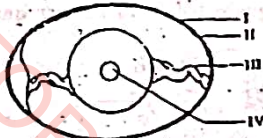
17. The gas produced during tissues respiration can be identified by using A. sodium hydroxide B. calcium carbonate C. copper sulphate D. calcium hydroxide.

18. When yeast respire anaerobically it converts simple sugars to carbon(IV) oxide and A. acid B. water C. oxygen D. Alcohol.
 19. Urea formation occurs in the A. liver B. Kidney C. heart B. lung
 Use the diagram below to answer questions 20 and 21.



20. The structure above, represents a A. thoracic vertebra B. Cervical vertebra C. caudal vertebra D. lumbar vertebra
 21. Blood vessels usually pass through the structure labeled A. II B. III C. IV D. V

Use the diagram below to answer question 22 and 23



22. The part labeled IV is the A. yolk B. airspace C. albumen D. germinal disc
 23. The structure that holds the yolk in position is labeled A. I B. II C. III D. IV
 24. A seedling grown in the dark is likely to be A. sturdy B. Stunted C. Dormant D. etiolated
 Use the diagram below to answer question 25 and 26



25. The part labeled II is the A. internal auditory meatus B. Fenestra ovalis C. ear ossicles D. middle ear canal
 26. The parts which function together to bring about hearing are labeled A. I, II, and IV B. I, II, III and IV C. I, II, IV and VI D. IV, V and VI
 27. The centre for learning and memory in the human brain is the A. olfactory lobe B. Cerebrum C. medulla oblongata D. Cerebellum
 28. The physical space-occupied by an organism together with its functional role in the community can be described as A, niche B. Environment C. Habitat D. Biome
 29. The hygrometer is used for measuring A. rainfall B. relative humidity C. salinity D. specific gravity
 30. The highest percentage of energy in an ecosystem occurs at level of the A. producers B. primary consumers C. secondary consumers D. Decomposers
 31. Carbon (IV) oxide content of the atmosphere is least affected by A. burning of fossil fuel B. cutting down and clearing of forests C. plants and animal respiration D. forest fires.
 32. A fresh water pond may contain A. pond skater, waterlily, shark and mosquito larva B. water lily, fish water scorpion and dragonfly larva C. tad pole, water boatman, leeches and crab D. water beetle, shrimps, water snail and water bug.
 33. The epiphytic habitat can best be described as A. aquatic B. Terrestrial C. arboreal D. Estuarine.

34. The distribution of plants in a rain forest is governed mainly by A. rainfall pattern B. Vegetation C. soil types D. amount of sunlight.
 35. The number of plant species obtained from a population study of a garden is as follows: Guinea grass (15) Ipomea spp. (5) sida spp (7) and Imperata spp. (23). What is the percentage of occurrence of Imperata spp.? A. 16% B. 23% C. 35% D. 46%
 36. The greatest influence on a stable ecosystem in nature is exerted by A. rainfall B. Animals C. man D. Pollution
 37. The factor that least affects food shortage in sub-saharan Africa is A. drought B. Flooding C. pests D. mixed-cropping
 38. In man, the ability to roll the tongue is a variation classified as A. structural B. Morphological C. anatomical D. Physiological.
 39. Which of the following statements is true of blood groups and blood transfusion? A. Group A can donate to group A only B. Group B can donate to group B only C. Group O is the universal recipient D. Group AB is the universal recipient
 40. A tall plant crossed with a dwarf one produces offspring of which half are tall and half are dwarf. What are the genotypes of the parents? A. Tt, tt B. TT, tt C. Tt, Tt D. TT, TT
 41. Both recessive and dominant characters are found A. at the same locus of a homologous chromosome B. at different locus of homologous chromosome C. on different chromosomes in the cell D. on the same chromatid in a chromosome
 42. Which of the following is likely to encourage inbreeding in plants A. Monoecious B. Dioecious C. Hermaphrodite D. Prbtandrous
 43. The probability of a baby being a boy or a girl depends on the contribution of the A. mother's sex cell B. Mother's X- chromosome C. father's sex cell D. father's somatic chromosome
 44. The ability of an organism to live successfully in an environment is known as A. succession B. Resistance C. adaptation D. Competition.
 45. For heterotrophic organisms, competition is least caused by the inadequacy of A. nutrients B. light C. space D. Mates
 46. The most important adaptation of xerophytes is the ability of the protoplasm to A. absorb water and swell B. resist being damaged by loss of water C. Shrink from the cell wall D. store sugar and minerals in the vacuoles.
 47. The stem of a typical aquatic plants usually has many A. water cavities B. water- conducting cells C. air cavities. D. intercellular spaces.
 48. A green snake in green grass is able to escape unnoticed from predators because of its A. warning colouration B. disruptive colouration C. cryptic colouration D. Counter shading
 49. The role of the male adult honey bee is to A. mate with the queen B. care for the young C. clean the hive D. ventilate the hive
 50. Darwin is considered the first scientist who correctly explained the theory of A. organic evolution C. special creation B. use and disuse D. spontaneous generation.

3. B: The association between the root nodule of a leguminous plant and Rhizobium is said to be symbiotic or mutualistic. In a symbiotic or mutualistic association, the two organisms involves benefit from the union.
 4. C: The evolutionary trend of the various divisions in kingdom plantae is: Schizophytes → Thallophytes → Bryophytes → Pteridophytes → Spermatophytes. Spermatophytes are divided into gymnosperms and angiosperms.
 5. B: Since Amoeba and Hydra cannot photosynthesize, they exhibit heterotrophic nutrition.
 6. C: Viviparity, a process of giving birth to young ones alive, occurs mainly in Mammals, Aves, Amphibians and Reptiles show oviparity (laying of eggs).
 7. A: The part labeled 'I' is the archegonium (female part) while the part labeled 'ii' is the antheridia (male part). Since both male and female gametes are available, the structure represents the gametophyte generation.
 8. D: As said earlier, the part labeled 'ii' is the antheridium, which is the male organ. The part labeled 'iii' is a root-like structure known as the rhizoid.
 9. A: Most monocots are easily recognized by their long and sword-like leaves.
 10. C: Amphibians dwell both on land (moist land) and in water.
 11. A: Minute structures that are sensitive to touch, smell and vibration are located in the antennae of insects.
 12. D: The veins of the leaf are formed from the vascular bundles (xylem and phloem).
 13. C: This is the test for starch.
 14. B: The enzyme invertase will hydrolyse sucrose to give its monosaccharide constituents - glucose and fructose.
 15. C: The roots absorb salt and water from the soil through osmosis. The salt and water are then transported through the xylem.
 16. C: Haemoglobin, an iron compound present in red blood cells (erythrocytes), transports oxygen in the form of oxy-haemoglobin and transport carbon (iv) oxide in the form of carbamino-haemoglobin.
 17. D: The gas produced during tissue respiration in carbon (iv) oxide (CO₂): C₆H₁₂O₆ + 6O₂ → 6CO₂ + 6H₂O. CO₂ is known to turn lime water milky. Lime water is a solution of calcium hydroxide.
 18. D: Anaerobic respiration produces carbon (iv) oxide and alcohol. C₆H₁₂O₆ → 2C₂H₅OH + 2CO₂.
 19. A: Urea is produced in the liver. Note that the excretion is through the kidney.
 20. B: This is the structure of a cervical vertebra. The part labeled 'I' is the neural spine, 'ii' is the neural canal, 'iii' are the cervical ribs, 'iv' is the Centrum while 'v' is the vertebral canal.
 21. D: The part responsible for the passage of the blood vessels is the vertebral canal.
 22. D: 'I' is the shell, 'ii' is the double shell membrane, 'iii' is the chalaza while 'iv' is the germinal disc.
 23. C: The yolk is held in position by the chalaza.
 24. D: Aetiolation (or etiolation) is shown by green plants that are grown in the dark. This causes the plants to have pale yellow colour and their stems are abnormally long.

BIOLOGY U. M. E. 2001, April 28th SOLUTION

Question Paper type: U

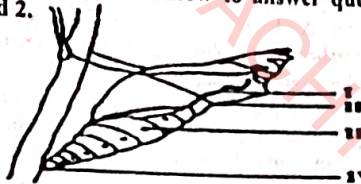
1. C: Water fleas, wood lice and barnacles are crustaceans
 2. A: Amoeba, chlamydomonas and paramecium are single free living cells while volvox is a colonial organism.

25. C: The part labeled 'ii' represents the ear ossicles. They are three in number: hammer (malleus), anvil (incus) and stapes (stirrup).
26. B: The parts which function together to bring about hearing are the ear canal (i), ear ossicles (ii), oval window (iii) and cochlea (iv).
27. B: The centre for learning and memory in the human brain is the cerebrum.
28. A: The space occupied by an organism and the role it performs in its environment collectively constitute the ecological niche of the organism.
29. B: The hygrometer is used for measuring relative humidity. This must not be confused for the hydrometer which is for measuring relative density.
30. A: The highest percentage of energy in an ecosystem occurs at the level of the producers while the lowest percentage occurs at the tertiary consumers level.
31. C: All of the given processes affect the CO₂ content of the atmosphere but the least in effect is plant and animal respiration.
32. B: Water lily, fish, water scorpion and dragonfly larva are usually found in fresh water.
33. C: Epiphytes are plants that inhabit tree trunks. Epiphytic habitat is an arboreal kind.
34. D: The trees in a rain forest occur in layers or strata. Those that are extremely tall may shield others from sunlight.
35. D: Guinea grass = 15, Ipomeas pp = 5, Sida spp = 7, imperata spp = 23
Total 15 + 5 + 7 + 23 = 50
Percentage of imperata spp = $\frac{\text{Number of imperata spp}}{\text{Total}} \times 100\%$
= $\frac{23}{50} \times 100\% = 46\%$
36. C: The activities of man greatly influence the ecosystem.
37. D: This type of questions requires just the common sense – mixed cropping is not, in anyway, harmful.
38. D: Rolling of the tongue is a function of the body. Physiological variation deals with how the body functions while morphological variation deals with the body structure.
39. D: *Group AB is the universal recipient while group O is the universal donor.
- A can donate to A and AB
 - B can donate to B and AB
 - AB can only donate to AB
 - O can donate to A, B, AB and O
40. A: A tall plant and a dwarf plant can produce only tall plants if the tall plant is homozygous for tallness. For a dwarf plant to be produced, the tall plant must be heterozygous for the tallness. Hence, the genotypes of the parents are Tt and tt.
41. A: They are found at the same locus of a homologous chromosome.
42. A: A monoecious plant is the one that has both the male and female flower on the same plant.
43. C: The sex of a baby depends on the father's sex cell. If the father donates a Y-chromosome, the baby will be a boy. But if the father donates X, the baby will be a girl.
44. C: The ability of an organism to live successfully in an environment is known as adaptation.
45. B: Light is an extremely important factor for only autotrophic organisms (photosynthetic organisms).
46. B: Xerophytes are plants that are adapted to living in extremely dry conditions. Their protoplasm is adapted to this situation without being damaged.

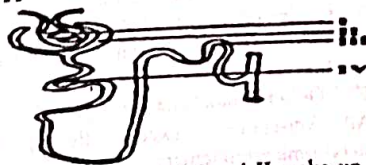
47. C: The stems of aquatic plants have many air cavities.
48. C: It shows crypsis. Crypsis is also known as concealing colouration.
49. A: The role of the male aduct honey bee is to mate with the queen.
50. A: Charles Darwin is considered the first scientist to correctly explain the theory of organic evolution. He propounded the theory of natural selection.

BIOLOGY U. M. E. 2000 May 6th
Question Paper Type: M

Use the diagram below to answer questions 1 and 2.

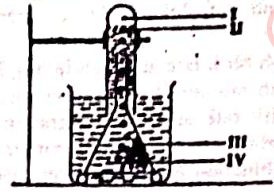


1. The part that will develop into an organ for feeling is labeled A. IV B. III C. II D. I
2. The part labeled II is the A. silk thread B. Thorax C. fore wing D. Anchor
3. Which of the following features are all associated with monocots? A. Fibrous root system, branched network of veins and one seed leaf B. Fibrous root system two seed leaves and floral parts in threes C. one seed leaf, petals in threes or groups of threes and parallel venation of leaves D. One seed leaf, net-veined leaves and petals in threes or multiples of three.
4. The set of fins that controls steering, balancing and change of direction and pitch in fish is A. dorsal and anal B. pectoral and pelvic C. Caudal and dorsal D. feather anal and pelvic
5. The most recently evolved structure in animals is the A. hair B. Cilium C. scale D. Feather
6. Coelom is absent in the class of animals termed A. mollusca B. reptilia C. Arthropoda D. coelenterata.
7. A characteristic of vertebrates that is unique to mammals is A. the presence of pentadactyl limbs B. parental care C. the possession of scrotum D. pulmonary circulation.
8. The order in which organic evolution has progressed in plants is A thallophyta, schizophyta, bryophyta, pteridophyta and spermatophyta B. schizophyta, thallophyta, bryophyta, pteridophyta and spermatophyte C. pteridophyta, spermatophyta, thallophyta, schizophyta, and bryophyte D. bryophyta, pteridophyta, spermatophyta, thallophyta, and schizophyta
9. In which part of the human body does the Secretion of the growth hormone occur? A. Head region B. waist region C. Neck region D. Gonads.
- Use the diagram below to answer questions 10 and 11

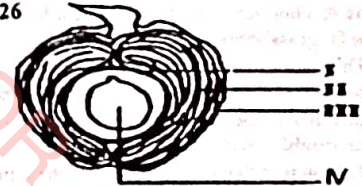


10. The parts labeled I and II make up the A. glomerulus B. convoluted tubules C. macula densa body D. Bowman's capsule
11. In mammals, reabsorption of salt takes place in A. IV B. III C. II D. IV
12. The part of the brain that controls body posture in mammals is the A. Thalamus B. Cerebellum C. spinalcord D. Cerebrum

13. Peripleral arrangement of vascular tissues in dicots is a characteristic of the internal structure of the A. leaf B. Petiole C. stem D. Root
- Use the diagram below to answer questions 14 and 15

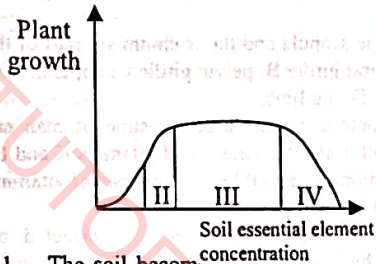


14. The substance labeled II originates from A. III only B. IV only C. I and IV D. III and IV
15. The gas occupying the space labeled I is A. carbon IV oxide B. Nitrogen C. hydrogen D. oxygen
16. The scapula and the ischium are part of the A. pectoral girdle B. pelvic girdle C. appendicular skeleton D. hind limb.
17. Bacteria in the large intestine of man are important in the A. synthesis of vitamins K and B₂ B. digestion of vegetables C. synthesis of vitamins A and D D. absorption of water
18. Short-sightedness can be corrected by lenses which are A. convex B. biconvex C. plano-convex D. Concave
19. The inner ear contains two main organs, namely, the A. eardrum and eustachian tube B. cochlea and semi-circular canals C. oval window and ossicles D. pinna and cochlea.
20. For growth to occur in organisms, the rate of A. food stores must below B. catabolism must exceed that of anabolism C. anabolism must exceed that of catabolism D. food storage must be high
21. The production of violet colouration, when dilute NaOH solution is added to a solution of food substance, followed by drops of 1% CuSO₄ solution while shaking indicates the presence of A. protein B. Carbohydrates C. fats D. reducing sugar.
22. The greatest amount of energy will be obtained by the oxidation of 100kg of A. meat B. Butter C. sugar D. Biscuits
23. The chamber of the mammalian heart with the thickest wall is the A. right ventricle C. right auricle B. left auricle D. left ventricle.
24. Serum differs from blood plasma because it A. contains blood cells and fibrinogen B. Contains soluble food and mineral salts C. lacks the blood protein fibrinogen D. lacks blood cells and albumin
- Use the diagram below to answer questions 25 and 26



25. The part labelled II is the A. mesocarp B. pericarp C. endocarp D. epicarp.
26. The fruit represented is mainly dispersed by A. animals B. water C. wind D. birds
27. In an experiment to estimate the volume of air in a soil sample using a measuring cylinder, it was found that Initial volume of water = p cm³, volume of soil before mixing with water = qcm³ Final volume of water after adding soil = rcm³. From the data above which of the following deductions is correct? A. r=p+q B. r>p+q C. q = r - p D. R < p + q
28. An ecological succession often leads to A. an increase in species diversity B. a decrease in species diversity C. an unstable community D. the dispersal of species

29. Atmospheric nitrogen is converted to soil nitrogen for plant use by A. nitrification and combustion B. putrefaction and lightning C. lightning and nitrification D. combustion and putrefaction
30. I. High birth rate and high immigration rate, II. Low birth rate and high immigration rate, III. low mortality rate and low emigration rate, IV. High mortality rate and high emigration rate. Which combination of the above can cause rapid overcrowding in climax biotic communities and human settlements? A. II and III B. I and III C. I and IV D. I and II
- Use the graph below to answer questions 31 and 32



31. The soil becomes the concentration of its essential elements is in the range labeled A. IV B. III C. II D. I
32. The range at which soil essential elements concentration is recorded for optimal plant growth is marked A. IV B. III C. II D. I
33. Which of the following growth activities in plants is brought about by gibberellins? A. rapid cell division B. Tropic response C. Cell elongation D. Main stem elongation
34. Which of the following are adaptations of animals to aquatic habitats? A. Gills, streamlined bodies and lateral line B. Lateral line, streamlined bodies and Lungs C. Gills scaly skin and lungs D. Gills, streamlined bodies and spiracles
35. Which of the following is an adaptation of forest species? A. Few stomata B. Thick bark C. Buttress roots D. Reduced leaves
36. In a food chain, each succeeding level in a forward direction represents? A. an increase in the number of individuals B. a decrease in the number of individuals C. an increase in the biomass of individuals D. again in the total energy being transferred.
37. The disaster that would have the least destructive impact on animal life and balance in nature is A. chemical pollution B. forest fires C. oil spillage D. grasshopper pests
38. The legs and beak of an egret resemble those of the heron because they A. both feed on fishes B. are both birds C. occupy similar niche D. occupy the same trophic level
39. The factors that determine the distribution of vegetative zones are? A. temperature, light, rain and humidity B. light, humidity, air and mist C. temperature, light, air and humidity D. Humidity, snow, frost and dew.
40. A cross between an albino female and a genetically normal male will result in offspring that are A. all albino B. all phenotypically normal C. all genetically normal D. half albino and half normal
41. The pollutants that contribute to the depletion of the ozone layer in the atmosphere are A. radioactive materials B. oxides of sulphur C. oxides of carbon D. chloro-fluorocarbons
42. The surest way to combine the best qualities of both parents in the offspring is by A. cross-breeding B. Inbreeding C. selective breeding D. pure breeding

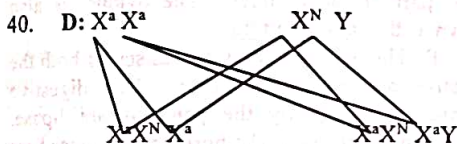
43. Blood grouping in human beings is derived from combination of A. two different alleles four different alleles C. Three different alleles D. two different genes B. forest fires D. grasshopper pests.
44. The older fossil-bearing rocks, in contrast to the more recent ones, are more likely to contain A. animals rather than plant remains B. invertebrates rather than birds C. flowering plants rather than mosses D. reptiles rather than fishes
45. In a group of male Agama lizards, the one with the brightest head colour is the A. dominant B. youngest C. oldest D. Largest
46. Examples of water-borne and sex-linked diseases are A. Taeniasis and malaria B. cholera and gonorrhoea C. typhoid and gonorrhoea D. dracunculiasis and haemophilia
47. The mutation theory of organic evolution was propounded by A. Gregor Mendel B. Hugo de Vries C. Jean Lamarck D. Charles Darwin
48. A certain savanna grasshopper changes colour from green during the rainy season to brown during the dry season and black after the dry season bush fires. The reason for these colour changes is that the A. grasshopper is getting older B. environmental temperature is changing C. grasshopper is avoiding predation D. grasshopper is frequently moulting
49. Complex social behaviour and organization are found mostly in A. insects B. birds C. reptiles D. mammals.
50. Which of the following structural features are adapted for uses other than water conservation? A. Succulent stems B. Scales in animals C. Spines in plant D. Feathers in birds

BIOLOGY U. M. E. 2000 May 6th SOLUTION
Question Paper Type: M

1. D: The organ for feeling will develop from the head region.
2. A: 'ii' is nothing but the silk thread for attaching the organism to the peg.
3. C: * Monocots are angiosperms with one seeds leaf.
- Their leaves show parallel venation.
 - They possess fibrous root system.
 - Their floral parts are in threes or multiples of three.
4. B: The pelvic and pectoral fins control steering, balancing and change of direction and pitch in fish.
5. A: The knowledge of evolutionary trend among vertebrates is very essential here. The most recently evolved structure will belong to the most recently evolved organism. The evolutionary order is: Pisces → Amphibians → Reptiles → Aves → Mammals. Since hair is found on the bodies of mammals (the most recently evolved vertebrate), it is the most recently evolved structure.
6. D: Coelenterates or cnidarians lack true coelom (body cavity). What they have is pseudocoelom.
7. C: * Only mammals have scrotum
- All vertebrates (except fishes) have pentadactyl limb arrangement.
 - Pisces, Aves and Mammals show parental care to their young ones.
8. B: The correct evolutionary trend in plants is: Schizophyte → Thallophyte → Bryophyte → Pteridophyte → Spermatophyte
9. A: The growth hormone is secreted from the pituitary gland (which is located at the head region).
10. C: The part labeled 'I' is the glomerulus while 'ii' is the Bowman's capsule. The

- glomerulus and the Bowman's capsule constitute the malpighian corpuscle or the malpighian body.
11. A: The part labeled 'iv' is the proximal convoluted tubule; selective reabsorption occurs there.
12. B: The cerebellum is concerned with the maintenance of body posture in mammals.
13. C: Peripheral arrangement of vascular tissues in dicots is a characteristic of the internal structure of the stem.
14. A: The part labeled 'iii' is water. The oxygen released (ii) is produced from water and not from CO₂.
15. D: The gas produced is oxygen.
16. C: The scapula is present in the pectoral girdle while the ischium is part of pelvic girdle. Recall that the limbs and the limb girdles (pelvic and pectoral girdles) form the appendicular skeleton.
17. A: Bacteria in the large intestine of man are important in the synthesis of vitamins K and B₂.
18. B: Short sightedness or myopia can be corrected by using concave lenses. Long-sightedness or hypermetropia can be corrected by using convex lenses.
19. B: The two major organ situated in the inner ear are the cochlea (which is used for hearing) and the semi-circular canals (which are used for balancing)
20. C: For growth to occur, the rate at which substances are built up (anabolism) must be greater than that at which substances are broken down (catabolism).
21. A: This is the Biuret test for protein.
22. B: Fats and oils contain the greatest amount of energy per weight out of the various classes of food. Are you surprised that lipids are superior to carbohydrates in this regard? That is the case; 1g of carbohydrate will contain about 16.7KJ of energy while 1g of fat and oil will contain about 37.6KJ of energy.
23. D: The walls of the left ventricle are the thickest since blood is pumped to all parts of the blood from the left ventricle.
24. C: The major difference between serum and the blood plasma is that the former lacks the blood protein fibrinogen.
25. A: The part labeled 'ii' is the mesocarp
26. B: Since the fruit has light pericarp, it is dispersed by water (like that, it can float on water).
27. D: The volume of the soil after water has been added will be less than the separate sum of the volume of the soil and the water. This is because on mixing with water, the air in the soil will escape; leading to a decrease in volume.
28. A: Ecological succession often leads to an increase in species diversity.
29. C: Lightning combines nitrogen with oxygen in the air to form nitrogen (ii) oxide. This further reacts with oxygen to produce nitrogen (iv) oxide. The oxide dissolves in water to produce HNO₃ and HNO₂. These acids react with metallic ions in the soil to produce nitrate. Nitrification also serves the same purpose of providing the soil with nitrate. Here, ammonium compounds are converted to nitrites which are then converted to nitrates.
30. B: High birth rate, high immigration rate, low emigration rate and low mortality rate cause population increase.
31. A: It can be seen that the range 'iv' comes with declining population growth. Thus, it implies that the soil is already becoming toxic to plants.

32. **B:** The optimal growth rate is observed in the range 'iii'.
33. **D:** * Gibberelins stimulate rapid stem elongation in some plants.
- They help in breaking dormancy in seeds and buds.
 - They aid germination of seeds.
 - They stimulate some biennial plants to flower during their first year of growth.
34. **A:** Possession of gills, streamlined bodies and lateral line are adaptations for aquatic life.
35. **C:** Forest species have buttress roots. Few stomata, thick bark and reduced leaves are adaptations for xerophytic plants.
36. **B:** As we move forward in a food chain, the number of individuals present decreases.
37. **D:** Chemical pollution, forest fires and oil spillage have substantially destructive impact on animal life and balance in nature.
38. **A:** Their legs and beaks look alike since they feed on the same kind of food - fish. Don't forget that the shapes of beaks and legs of birds are used for predicting their feeding habit.
39. **A:** The factors that determine the distribution of vegetation zones are temperature, light, rainfall and humidity.



Since albinism is a recessive trait, $X^a X^N$ will be normal.

41. **D:** Chlorofluorocarbons are the major depleters of the ozone layer.
42. **B:** Inbreeding is the mating of closely related individuals in a species. Inbreeding is employed to retain certain desirable characteristics within a given population.
43. **C:** Blood grouping in human beings is derived from combination of three different alleles - A, B and O.
44. **B:** The older fossil-bearing rocks will contain more evolutionarily primitive species than recent ones. Invertebrates are more primitive than vertebrates.
45. **B:** The lizard with the brightest head colour is the youngest.
46. **D:** Dracunculiasis is a water-borne disease while haemophilia is a sex-linked disease.
47. **D:** The mutation theory of organic evolution was propounded by Hugo de Vries in 1901.
48. **C:** The grasshopper was changing colour so as to blend with its environment and thus avoid predation.
49. **D:** Mammals are the most organized group of animals. They also show the most complex social behavior.
50. **D:** Features are mainly used for flight.

BIOLOGY U. M. E. 1999 May 8th Question

Type D

1. The structure that is most commonly identified in all living cells under the light microscope is the A. mitochondrion B. chloroplast C. nucleus D. Ribosome
2. In plant cells, the chloroplasts are located A. inside the cell wall B. outside the protoplasm C. within the vacuole D. within the cytoplasm
3. Which of the following is an organ? A. Guard cell. B. Liver C. Xylem bundle D. Blood.

4. The division of a body into two equal halves along a longitudinal plane is called A. bilateral symmetry B. transverse section C. radial symmetry D. longitudinal section
5. The organism that has hydrostatic skeleton is A. Tilapia B. Hydra C. mosquito larva D. Earthworm
6. The key event in the transition of the amphibians from water to land is the A. replacement of the gills with lungs B. possession of webbed limbs C. development of long hind limbs D. possession of tympanic membrane
7. The group of Arthropods that has no antennae is the A. Crustacea B. Chilopoda C. Aracnida D. Diplopoda.
8. In which of the following organisms does each cell combine the functions of nutrition, reproduction and growth? A. Rhizopus. B. Dryopteris C. Brachymerium D. Spirogyra
9. The habitat of the cysticercus of *Taeniasolium* is A. alimentary canal of cattle B. Muscles of pig C. Alimentary canal of pig D. muscles of cattle.

Use the diagram below to answer questions 10 and 11.



10. The structure labeled III represents the A. mandible B. Palp C. proboscis D. Labium.
11. The structure labeled II is used for A. tasting B. Feeling C. biting D. Sucking
12. The possession of scales, laying of eggs with shells and bony structure of the head are characteristics shared by A. birds and reptiles B. fishes and birds C. reptiles and fishes D. birds and molluscs.
13. In dissection, the rib cage of a mammal has to be opened in order to expose the A. diaphragm B. liver C. heart D. Sternum
14. The modes of nutrition in Nitrobacter, Ascaris and homo sapiens respectively are A. photosynthetic, and holozoic B. chemosynthetic, parasitic and holozoic C. photosynthetic, parasitic and heterophytic D. chemosynthetic, holophytic and holozoic
15. The dark reaction of photosynthesis involves A. fixation of carbon (IV) oxide to give a six-carbon sugar B. fixation of carbon (IV) oxide with the help of oxygen C. use of carbon (IV) oxide to produce glucose using ATP D. fixation of carbon (IV) oxide on chlorophyll using hydrogen
16. Yellowing of leaves is a symptom associated with deficiency of A. iron, calcium and magnesium B. nitrogen, sulphur and potassium C. sulphur, phosphorus and iron D. magnesium, nitrogen and iron
17. The richest sources of vitamin A are A. palm oil and groundnut oil B. palm oil and carrots C. rice and groundnut oil D. oranges and carrots.
18. After a meal of yam has been digested, the highest concentration of glucose is to be found in the A. hepatic artery B. pulmonary vein C. hepatic portal vein D. posterior vena cava.
19. The force that holds water together in the form of a stream within the xylem tube is the A. form of water molecules to one another by cohesion of water molecules B. force of gravity attracting the hydrogen bonds C. water molecules through the hydrogen bonds C. attraction between the water and xylem by osmotic

force D. normal flow of water from the ground with the help of gravitational force.

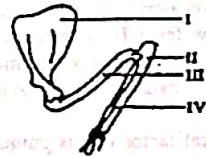
20. Substances manufactured by the leaves are transported to other parts of the plant through the A. xylem B. companion cells C. sieve tubes D. Cambium.
21. The lymphatic system of mammals rejoins the blood circulatory system at the A. hepatic vein B. subclavian vein C. renal vein D. common iliac vein.
22. Mammals acclimatize to reduce oxygen content at high altitudes by A. the stimulation of marrow to reduce the amount of erythrocytes produced B. increasing the rate at which erythrocytes are destroyed C. the stimulation of marrow to produce more erythrocytes D. Increasing the breakdown of the protein portion of the erythrocytes.
23. In woody stems, gaseous exchange takes place through the A. micropyles B. stomata C. lenticels D. vessels.

Use the diagram below to answer questions 24 and 25



24. The structure labeled II is known as A. sweat gland B. lymph vessel C. blood vessel D. nerve ending.
25. The part labeled III is for A. protection B. Insulation C. Lubrication D. Growth
26. The chitin in the exoskeleton of many arthropods is strengthened by A. calcium compounds B. organic salts C. liquids D. proteins.

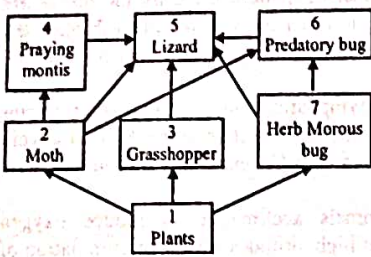
Use the diagram below to answer questions 27 and 28



27. Which of the bones is the radius? A. I B. II C. III D. IV
28. The structure labeled II articulates with III to form a A. sliding joint B. hinge joint C. pivot joint D. ball - and - socket joint
29. Bacteria multiply rapidly by means of A. budding B. fragmentation C. Binary fission D. spore formation.
30. Insects visit flowers in order to A. feed on the nectar B. deposit pollen on the stigma C. pollinate the flowers D. transfer pollen from anthers
31. Fertilization in humans usually takes place in the A. lower part of the uterus B. upper part of the uterus C. lower part of the oviduct D. upper part of the oviduct.
32. In mammals, the organ which performs digestive and endocrine functions is the A. liver B. Pancreas C. gastric gland D. salivary gland
33. In epigeal germination, the cotyledons are A. carried above the ground by the elongating hypocotyl B. pulled underground by the elongating hypocotyls C. pulled underground by the elongating epicotyl D. carried above the ground by the elongating epicotyl.
34. The correct sequence for the perception of smell in mammals is A. chemicals → olfactory nerve endings → brain B. dissolved chemicals → nasal sensory cells → brain C. chemicals → mucus membrane → sensory cells → brain D. dissolved

chemicals → sensory cells → olfactory nerve → brain.

Use the diagram below to answer questions 35 and 36.



35. The biomass is likely to increase in the sequence A. 1 → 2 → 4 → 5 B. 1 → 3 → 4 → 5 C. 3 → 5 → 6 → 7 D. 5 → 4 → 3 → 1

36. Primary consumers are found in A. 1, 2 and 3 B. 1, 3 and 7 C. 2, 3 and 7 D. 2, 4 and 5

37. The sign + is used to indicate an association where an organism gains, while 0 is used where an organism is unaffected. An association indicated as + 0 is known as A. predation B. commensalism C. parasitism D. Competition.

38. Which of the following characterizes the white mangrove? A. prop roots B. buttress roots C. Breathing roots D. Stilt roots

39. Floating microscopic heterotrophs are mostly grouped as A. Phytoplankton B. Zooplankton C. microbes D. Nekton.

40. A soil consisting of alumina and iron (II) oxide is known as A. loamy B. clayey soil C. laterite D. Podzol.

41. Vaccination is carried out in order to A. Check the production of poison B. increase the activity of white blood cells C. increase the number of red blood cells D. stimulate the production of antibodies

42. The construction of dams may lead to an increase in the prevalence of A. typhoid fever, measles and yellow fever B. tuberculosis, kprosy and trypanosomiasis C. guinea worm, malaria and tuberculosis D. malaria, bilharziasis and onchocerciasis.

43. The biological factor that is unique to each individual is the A. DNA B. eye colour C. blood group D. RNA.

44. If the offspring of a cross between a brown mouse (bb) and a black mouse (BB) are allowed to interbreed, how many different genotypes would result? A. 2 B. 3 C. 4 D. 5

45. The most important environmental factor which epiphytes in the rain forest compete for is A. water B. nutrient C. light D. space.

46. The least adaptive feature for arboreal life is the A. possession of four limbs B. possession of claws C. development of a long tail D. counter shading of coat colour.

47. The loud cry made by a brooding hen when a predator is around is meant to A. alert the poultry attendants B. attract cocks to come and fight the predator C. advertise the boundaries of its territory to intruders D. warn its chicks and other chickens of impending danger.

48. The very bright colours in some types of mushroom A. are a warning that they may be poisonous B. indicate that they are very tasty C. attract potential transporters of their pores D. perform the same function as bright colours in flowers.

49. Which of the following is one of Lamarck's theories? A. some variations are favourable to existence in a given environment than others. B. All living organisms are constantly involved in a

struggle for existence. C. The size of a given population remains fairly constant D. New species originate through the inheritance of acquired traits. 50. From an evolutionary standpoint, the older a fossil-bearing rock is, the more likely it is to contain A. eyes as opposed to amphibians B. invertebrates as opposed to vertebrates C. angiosperms as opposed to algae D. vertebrates as opposed to invertebrates.

BIOLOGY U. M. E. 1999 May 8th SOLUTION Question Type D

1. C: The nucleus is the most commonly identified in all living cells under the light microscope.

2. D: Just like any other organelle, the chloroplasts are suspended in the cytoplasm.

3. B: Guard cell → Cell

Liver → Organ

Xylem bundle → Tissue

Blood → Tissue

4. A: Organisms that are bilaterally symmetrical are those that can be divided into two equal and identical parts along a longitudinal plane.

5. D: In hydrostatic skeleton, fluid pressure is used to provide support. It occurs in soft-bodied animals such as earthworm

6. A: For the amphibian to be able to cope in a terrestrial habitat, the gills are replaced with lungs.

7. C: Arachnids have no antenna. They have four pairs of walking legs. Examples are spider, scorpion, tick etc.

8. D: Spirogyra is a filamentous organisms. In filamentous organisms, each cell functions independent of other cells.

9. B: The cysticercus of *Taeniasolium* dwells in the muscles of pig (which is the secondary host). Human beings are the primary host.

10. D: The part labeled 'iii' represents the labium.

11. B: The structure labeled 'ii' is used for feeling.

12. A: All birds possess scales, lay eggs with shells and have bony head structure.

13. C: The mammalian heart is protected by the rib cage.

14. B: Nitrobacter is a chemosynthetic organism; Ascaris is a parasite of man while *Homo sapiens* (human beings) are holozoic.

15. A: In the light reaction, water is split using sunlight energy to form hydrogen and hydroxide ion. The hydrogen produced is used to reduce carbon (iv) oxide to form a six-carbon sugar in the dark reaction.

16. D: Yellowing of leaves indicates the absence of chlorophyll. Thus, the concerned plant is deficient in elements necessary for chlorophyll formation - magnesium, nitrogen and iron.

17. B: The richest sources of vitamin A are palm oil and carrots.

18. C: Since the hepatic portal vein carries digested food from the small intestine to the liver, the highest concentration of glucose will be found in it.

19. A: The forces of cohesion hold the water molecules together. Hydrogen bond is present in water.

20. C: Xylem transports water and mineral salts while phloem transports manufactured food substances. The components of the phloem are the phloem fibre, phloem parenchyma, sieve tube and the companion cell. The sieve tube is the main food conducting part of phloem.

21. B: The lymphatic system of mammals rejoins the blood circulatory system at the subclavian vein.

22. C: The bone marrow will have to be stimulated to produce more erythrocytes. This is because more oxygen-carrying pigment will be available.

23. C: In woody stems, gaseous exchange takes place through the lenticels.

24. A: The structure labeled 'ii' is known as the sweat gland.

25. B: The part labeled 'iii' is the sub-cutaneous fat layer. It serves as an insulator preventing heat loss from the body.

26. A: The chitin in the exoskeleton of arthropods is strengthened by the deposition of protein and minerals like calcium carbonate and calcium phosphate.

27. D: The two bones of the fore arm are the radius and ulna. The radius is shorter than the ulna.

28. B: The ulna articulates with the humerus to form the elbow joint. The elbow joint is a hinge type of joint.

29. C: Bacteria multiply rapidly by binary fission.

30. A: Insects visit flowers in order to feed on the nectar.

31. D: Fertilization in humans takes place in the upper part of the oviduct. The oviduct is also known as the fallopian tube.

32. B: The mammalian pancreas serves both the digestive and endocrine roles. The digestive enzymes produced by the pancreas are lipase, amyllopsin and trypsin. The hormones produced are insulin and glucagon.

33. A: In epigeal germination, the cotyledons are carried above the ground by the elongating hypocotyls. In hypogeal germination, the cotyledon is pulled underground by the elongating epicotyls.

34. D: The correct sequence is: Dissolved chemicals → sensory cells → olfactory nerve → brain.

35. D: The biomass will increase from the tertiary consumer to the producer.

36. C: Moth, grasshopper and herbivorous bug are primary consumers since they feed directly on the producers.

37. B: An association in which an organism benefits while the other neither benefits nor suffers any harm is known as Commensalism.

38. C: Breathing roots or pneumatophores are features of the white mangrove.

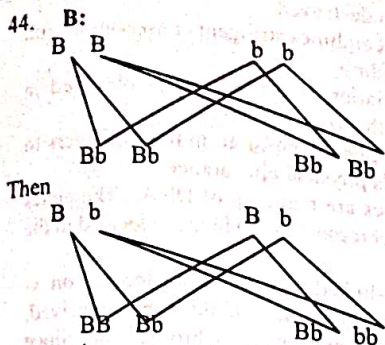
39. B: Floating microscopic heterotrophs are called zooplankton while the autotrophic ones are called phytoplankton.

40. C: Laterites are soil types that are rich in iron and aluminium. Laterites are formed in hot and wet tropic areas.

41. D: Vaccination refers to the introduction of the mild form of the disease-causing organism into the body. This is to stimulate the formation of antibodies and consequently build immunity against the disease.

42. D: The causative organism of malaria (*plasmodium falciparum*) breeds in water, that of onchocerciasis (*Onchocercavolvulus*) breeds near water while the intermediate host of bilharzias is water snail. It is therefore understandable that the construction of a dam will increase the prevalence of these diseases as they are all associated with water.

43. A: No two individuals have the same DNA - it is unique to each individual



Thus, three genotypes (BB, Bb & bb) are obtainable

45. C: The main environmental factor that epiphytes compete for is light.

46. D: Counter shading is not an important adaptive feature for arboreal life.

47. D: The loud cry made by a brooding hen when a predator is around is meant to warn its chicks and other chickens of impending danger.

48. A: The bright colour is a warning colouration.

49. D: Jean Baptiste Lamarck, in his theory of use and disuse submitted that acquired traits are inheritable.

50. B: This is the same as question 44, 2000.

BIOLOGY U. M. E. 1998

1. The nucleus is considered the central organelle of a cell because it A. contains the genetic material B. contains the nuclear sap C. is bounded by the nuclear membrane D. is located at the centre of the cell.

2. The prokaryotic cell type is characterized by a A. complex cytoplasm in which different regions are poorly defined B. localization of different regions of the cell into tissues C. collection of organelles and macromolecular complexes D. simple cytoplasm with well defined regions

3. The natural tendency of organisms as they evolve is to A. decrease in size B. increase in number C. develop specialized structures D. feed indiscriminately.

4. In snails, the hard calcareous shells are secreted by the A. radula B. Ctenidium C. pneumostome D. Mantle.

Use the diagram below to answer questions 5 and 6.



5. The structure labeled I is formed as a result of the fusion of A. two pairs of nuclei B. several pairs of nuclei C. a pair of nuclei D. two pairs of nucleoli

6. The special name of the part labeled II is A. game tangium B. Hypha C. suspensor D. Zygosporangium

7. The ability of the cockroach to live in cracks and crevices is enhanced by the possession of A. wings and segmented body B. compound eyes C. claws on the legs D. dorso-ventrally flattened body.

8. The caste of termites that lacks pigmentation is the A. king B. worker C. soldier D. Queen.

9. The structures that prevent food particles from escaping through the fish gills are called gill A. arches B. Filaments C. Rakers D. Lamellae.

10. A distinguishing feature of mammals is the possession of A. skin B. Scale C. nail D. Hair.

11. Which of the following structures is capable of producing more tissues in the stem of a

herbaceous flowering plants? A. epidermis B. Pericycle C. xylem D. Cambium.

12. The manufacture of carbohydrates by plants takes place only in A. the leaves B. the green stems C. chlorophyllous parts D. flowering plants.

13. In a water-culture experiment, a plant showed poor growth and yellowing of the leaves. These may be due to deficiency of A. Copper B. Iron C. magnesium D. Calcium

14. In Million's test, when the reagent is added to a protein food item, a white precipitate is produced which turns A. blue on heating B. yellow on heating C. green on heating D. red on heating.

15. Regulation of blood sugar level takes place in the A. pancreas B. Ileum C. liver D. Kidney

16. Unicellular organisms transport essential nutrients directly to all parts of their bodies by the process of diffusion because, they have A. a large volume to surface area ratio B. a large surface area to volume ratio C. their bodies immersed in the nutrients D. their outer membrane made of cellulose.

17. The heart of the adult frog consists of A. two auricles and two ventricles B. one auricle and one ventricle C. two ventricles and one auricle D. one ventricle and two auricles.

18. In adult mammalian blood, the cells which lack nuclei are the A. erythrocytes B. Lymphocytes C. leucocytes D. Phagocytes

19. Which of the following movements occur during exhalation? A. The diaphragm and intercostal muscles relax B. The thoracic cavity increases in volume. C. the diaphragm and intercostal muscles contract D. The diaphragm contracts and the intercostal muscles relax.

20. In which of the following groups of animals is the malpighian tubule found? A. Lizards, snakes and frogs B. Crickets, houseflies and grasshoppers. C. millipedes, centipedes and scorpions D. earthworms, roundworms and flatworms.

21. Which of the following is not a function of the mammalian skeleton? A. protection B. Respiration C. Transportation D. Support

Use the diagram below to answer questions 22 and 23.



22. The ovary represented is A. half-superior B. Inferior C. superior. D. half-inferior.

23. The corolla is partly represented by A. I B. II C. III D. IV

24. The most reliable estimate of growth is by measuring changes in A. length B. Volume C. surface area D. dry weight:

25. A dry fruit formed from two or more carpels containing several seeds is a A follicle B. Legume C. capsule D. Schizocarp.

26. The outermost embryonic membrane in the mammal is the A. amnion B. Chorion C. allantois D. yolk sac.

27. The small masses of nervous tissue in which many neurons have their nuclei are called A. dorsal roots B. ventral roots C. ganglia D. synapses.

28. A group of organisms of different species living in a particular area is described as a A. colony B. community C. population D. Niche

29. Which of the following is the direct consequence of transferring energy from one trophic level to another? A. An increase in biomass. B. A decrease in the efficiency of energy conversion. C. An increase in the total numbers of

resulting individuals. D. A decrease in the resulting biomass

30. The condition that encourages denitrification is A. low soil oxygen B. high soil nitrogen C. absence of soil bacteria D. lighting and thunderstorm.

31. A freshwater plant such as water lily can solve the problem of buoyancy by the possession of A. aerenchymatous tissues B. dissected leaves C. thin cell walls of the epidermis D. water-repelling epidermis

32. The sequence of the biomes in Nigeria from Port Harcourt to Damaturu is A. Estuarine → rain forest → Guinea savannah → Sahel savannah B. rain forest → Guinea savannah → estuarine → desert C. estuarine → Guinea savannah → rain forest → sahel savannah D. rain forest → estuarine → Guinea savannah → desert

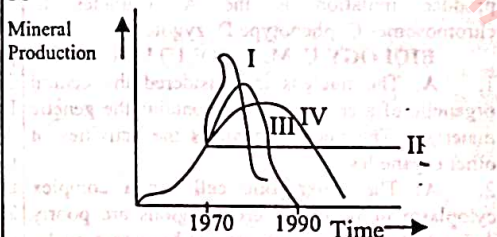
33. Soil micro-organism are beneficial because of their involvement in A. photosynthesis B. translocation C. cycling of nutrients D. respiration using soil air.

34. Which of the following groups of diseases associated with water? I. Onchocerciasis II. Schistosomiasis III. Dracunculiasis IV. Elephantiasis V. Taeniasis A. I, II, and III B. II, IV and V C. II, III and IV D. I, II and V.

35. One of the ways in which body cells differ from gamete cells is in the A. type of centromeres they contain B. number of chromosome pairs they contain C. type of chromatids they contain D. number of chromosomes they contain.

36. In blood transfusion, agglutination occurs when A. white blood cells from two individuals meet B. two different antibodies meet C. two different antigens meet D. contrasting antigens and antibodies meet

Use the graph below to answer questions 37 and 38



37. The unrestricted pattern is represented by A. IV B. II C. III D. IV

38. The line that represents efficient recycling combined with stringent conservation is A. IV B. II C. III D. IV

39. After one week of life, the weights of five chicks the same sex hatched simultaneously from the eggs of the same hen and fed on the same diet were 45g, 40g, 35g, 33g, and 30g. This is an example of A. growth rate B. natural selection C. variation D. Mutation

40. The phenotype of an individual can be summed up as the A. totality of the expressed traits B. individual's physical appearance C. individual's entire genetical make - up D. physiological traits of the individual.

41. The correct increasing order of size for the cell components responsible for heredity is the alternate depletion patterns of mineral resources overtime. A. Chromosome → DNA nucleus → gene B. DNA → gene → chromosome → nucleus C. chromosome → nucleus → DNA → gene D. DNA → gene → nucleus → chromosome.

42. A sex-linked character cannot be passed on directly from A. father to son B. mother to daughter C. mother to son D father to daughter.

43. The biological association that contributes directly to succession in a community is A. competition B. Predation C. parasitism D. commensalism.
44. The group of insects that have mouth parts adapted for both piercing and sucking is A. cockroaches, aphids and mosquitoes B. aphids, houseflies and moths C. mosquitoes, tse-tse flies and aphids D. aphids, beetles and grasshopper.
- Use the diagrams below to answer questions 45 and 46



45. The bird's bill adapted for fishing is labeled A. I B. II C. III D. IV
46. Toes of the feet ending in a sharp, curved hook suitable for holding and tearing are most likely to belong to the bird with the bill in A. I B. II C. III D. IV
47. In the honey bee colony, the drones are A. sterile males with reduced mouth parts B. sterile males with well - developed mouth parts C. fertile males with reduced mouth parts D. fertile males with well - developed mouth parts
48. In the whistling pine, leaves are reduced to brown scales and young stems are green. This is an adaptation for A. obtaining food B. conserving nutrients C. storing water D. reducing transpiration.
49. The best explanation for the theories of natural selection is that A. all organisms have equal capacity for survival in their habitats B. organisms have varying capacities for survival in their habitats C. organisms compete for resources and better competitors survive and thrive D. habitats allow only organism that will not have to compete for survival.
50. The basic point of impact by changes which produce mutation is the A. Gametes B. chromosomes C. phenotype D. zygote

BIOLOGY U. M. E. SOLUTION 1998

1. A: The nucleus is considered the central organelle of a cell because it contains the genetic material. The nucleus controls the activities of other organelles.
2. A: The prokaryotic cell has a complex cytoplasm in which different regions are poorly defined. Prokaryotic cells do not have true nuclei and membrane-bound organelles.
3. C: Complexity in organisms increases as they evolve. Thus, more specialized structures are progressively needed.
4. D: The mantle of snails contains glands that produce the shell. The mantle is a thin tissue layer that covers most of the body of a molluscan.
5. B: Since fungi (except yeast) are multicellular, they are multinucleated. Thus, a fusion of several pairs of fusion has occurred.
6. C: The structure produced from the union is the gametangia. The hypha behind each gametangium is called a suspensor.
7. D: Its dorso-ventrally flattened body enhances a cockroach to live comfortably in cracks and crevices.
8. B: The workers are not pigmented; others are. The workers are also wingless and sterile.
9. C: Gill rakers serve as a sieve, protecting the gill filaments from food particles.
10. D: The distinguishing features of mammals are hair and mammary gland.
11. D: The cambium is meristematic in nature.

12. C: Photosynthesis is not limited to the leaves, it occurs at any part of the plant that has chlorophyll.
13. C: If it is only yellow leaves, one can conclude that it is a deficiency symptom of magnesium, iron or nitrogen since these elements are responsible for chlorophyll formation. But the plant also shows poor growth; then, the plant is clearly deficient of magnesium.
14. D: A red precipitate is observed when protein is heated with millon's reagent.
15. C: The liver regulates the blood sugar level using the hormones produced from the pancreas - insulin and glucagon. Excess glucose is converted to glycogen using insulin. Also, glycogen is converted back to glucose using glucagon.
16. B: The possession of a large surface area to volume ratio makes diffusion an efficient means of transport in unicellular organisms.
17. D: The heart of a typical amphibian is three-chambered: two auricles and one ventricle.
18. A: The erythrocytes (red blood cells) are anucleated.
19. A: During exhalation, the ribs move downwards and inwards. The relaxation of the external intercostals muscles and the contraction of the internal ones cause the diaphragm to relax and curve upward leading to a decrease in the volume of the thoracic cage.
20. B: Crickets, houseflies and grasshoppers are insects. The malpighian tubule is the excretory structure of insects.
21. C: The skeleton is mainly for support and protection of internal organs. It also functions during respiration; for instance the movement of ribs and diaphragm are associated with breathing. However, the skeleton is not used for transportation in any way.
22. B: Since the ovary is below other floral parts, it is said to be an inferior ovary.
23. A: The part labeled 'I' is the corolla.
24. D: The dry weight is the most reliable parameter for estimating growth.
25. D: A schizocarp is a many seeded fruit. Produced from a syncarpous ovary.
26. B: The chorion is the outermost embryonic membrane. It allows the passage of oxygen through the porous shell.
27. C: A group of cell bodies of neurons with a nucleus is called a ganglion. The plural form of a ganglion is ganglia.
28. B: A group of organisms of different species living in a particular area is described as a community.
29. D: Energy transfer from one trophic level to another causes a decrease in the total biomass.
30. A: The condition that encourages denitrification is low soil oxygen.
31. A: Aerenchymatous tissues help the plants to stay afloat in water.
32. A: The right sequence is: Estuary → rainforest → guinea savannah → sahel savannah.
33. C: Soil micro-organisms are involved in cycling of nutrients.
34. A: Onchocerciasis, schistosomiasis and dracunculiasis are all associated with water.
35. B: One of the differences between body cells and gamete cells is the number of chromosome pairs they contain - body cells are diploid (2n) while gamete cells are haploid (n).
36. D: When blood samples with contrasting antigens and antibodies are mixed, agglutination occurs.

37. A: In pattern 'I', more mineral is being produced than destroyed.
38. A: 'iv' combines stringent conservation with efficient recycling.
39. C: Variation is the difference observed in organisms of the same species.
40. B: The phenotype of an individual refers to the individual's physical appearance.
41. B: Genes are made up of DNA. The genes are found on chromosomes which are located in the nucleus.
42. A: Sex-linked characters are located on x-chromosomes. For a male child to be conceived, the father will always donate y-chromosome. Since the characters are not located on the y-chromosome, it is not possible for a father to pass it to the son.
43. A: Competition leads to succession.
44. C: Houseflies have sponging mouth parts, grasshoppers and cockroaches have biting and chewing mouth part while mosquitoes, tse-tse flies and aphids have piercing and sucking mouthparts.
45. D: A long straight bill is definitely adapted for fishing.
46. B: A bird with feet ending in a sharp, curved hook suitable for holding and tearing is unequivocally a carnivorous bird; this will also reflect in the shape of the bill or beak. The bill labeled 'ii' is clearly adapted for tearing flesh.
47. C: Drones are the potential mates of the queen during the nuptial flight. They are fertile males with reduced mouthparts and powerful wings.
48. D: Transpiration rate from reduced leaves are to the barest minimum. Thus, this is an adaptation for reducing transpiration.
49. C: According to the theory of natural selection, organisms with better competitive advantage are those that will survive and pass the favourable variations to their off-spring.
50. B: Mutation is the change in the genetic make-up of an organism. Since genes are located on chromosomes, chromosomes are the points of impact.

December 3rd BIOLOGY U. M. E. 1994

1. The membrane surrounding the vacuole in a plant cell is called the A. plasmalemma B. Tonoplast C. Nuclear membrane D. endoplasmic reticulum
2. The smallest living organisms which share the characteristics of both living and non-living matter are A. bacteria B. Fungi C. viruses D. Protozoa
3. Green plants are distinguished from other living organisms by their ability to A. make use of water B. make use of oxygen C. respond to sunlight D. manufacture their own food.
4. The soil swallowed by the earthworm to form the worm cast is ground up in the A. clitellum B. Prostomium C. mouth D. Gizzard
5. Which is the correct order in an evolutionary sequence for the following plant groups? A. Bacteria → ferns → algae → mosses → seed plants B. Bacteria → ferns → mosses → algae → seed plants C. Bacteria → algae → mosses → ferns → seed plants D. Bacteria → mosses → algae → ferns → seed plants
6. In amoeba, osmoregulation is carried out by the A. pseudopodium B. food vacuole C. contractile vacuole D. Nucleus
- Use the diagram below to answer questions 7 and 8

7. The part used for feeling is labeled
A. I B. J C. K D. L



8. The mouth part of the insect is adapted for A biting and chewing B. sucking and chewing C. biting and sucking D. piercing and sucking

9. Which of the following combinations differentiates a bony fish from a cartilaginous fish? I. presence of gills. II. Absence of gill slits III. Possession of bony skeleton IV. Possession of laterally compressed body V. Possession of dorso-ventrally compressed body A. I, II and III C. II, III and IV B. I, III and IV D. II, III and V

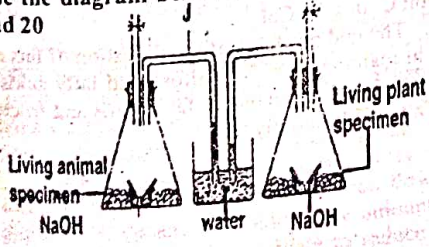
10. Which is the most important adaptation of a bony fish to life in water? A. The possession of a streamlined shape B. The presence of overlapping scales C. The covering of the body by thin film of slime D. The possession of a caudal fin
Use the diagram below to answer questions 11 and 12



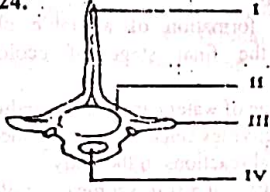
Transverse section of a dicotyledonous root

11. Which of the labeled parts allows for efficient absorption of water and minerals? A. I B. II C. III D. IV
12. Starch is usually stored in the part labeled A. I B. II C. III D. IV
13. The failure of transport and respiratory systems in plants as well as the presence of reddish colour in stems and leaves result from the deficiency of A. magnesium B. Nitrogen C. potassium D. phosphorus
14. The dental formula $\frac{3}{3} \frac{c}{1} \frac{pm}{4} \frac{m}{3}$ is that of a A. goat B. rabbit C. man D. Dog
15. The nitrifying bacteria, Nitrosomonas, convert ammonia to. A nitrites B. nitric acid C. nitrates D. nitrous oxide
16. The activity of ptyalin is likely to decrease with an increase in the concentration of A. oxygen B. starch C. protein D. Acid
17. The phloem parenchyma is sometimes used for A. food storage B. supporting the stem C. production of the sieve tube D. transporting water
18. The process by which a red blood cell placed in distilled water absorbs water until it bursts and releases its contents into the surrounding is known as A. osmosis C. Turgidity B. Plasmolysis D. Haemolysis

Use the diagram below to answer questions 19 and 20



19. The most appropriate title for the set up is A. quantitative measurement of respiration in plants and animals B. measurement of respiratory rates in living organisms C. comparison between photosynthesis and respiration D. comparison of respiratory rates in plants and animals
20. The part labeled J is called A. Porosimeter B. photometer C. Manometer D. auxanometer
21. A circulatory system that does not allow mixing of oxygenated and de-oxygenated blood in mammalian heart is referred to as A. open B. haemocoelic C. single D. Closed.
22. Which of the following waste products in plant is excreted through the stomata and lenticels? A. carbon dioxide B. alkaloids C. Tannins D. Anthocyanins
Use the diagram below to answer questions 23 and 24.



23. The vertebra illustrated is A. lumbar B. Thoracic C. caudal D. Cervical
24. The neural arch is labeled A. I B. II C. III D. IV
25. In animals meiosis comes A. after fertilization B. after every mitotic division C. before fertilization D. before every mitotic division.
26. The fleshy base of a flower to which the different floral parts are attached is known as A. calyx B. Sepals C. thalamus D. Hypothalamus
27. When a short-sighted person views a distant object without spectacles, the image is formed A. on the retina B. in front of the retina C. behind the retina D. on the blind spot
28. The graph above shows the relationship between the body and atmospheric temperatures for dog and lizard. What is the most appropriate deduction that could be made from the graph? A. Lizards are more likely to survive hazards than dogs B. Both animals maintain a constant body temperature. C. The dog's body temperature is independent of the external temperature D. The lizard's body temperature varies with that of the dog.

29. The part of the brain that controls heart beat and breathing is the A. olfactory lobe B. Cerebellum C. cerebral hemisphere D. Medulla oblongata
Use the list of ecological constituents below to answer questions 30 and 31.

1. Mango 2. Spear grass 3. Goat 4. Sheep 5. Temperature 6. Beans 7. Rock 8. Water
30. Item 1- 4 can be regarded as A. a population B. a community C. an ecosystem D. a niche
31. The physical factors are represented by A. 1, 5, 6 B. 4, 5, 7 C. 5, 7, 8 D. 6, 7, 8
32. Which of the following sets is made up of decomposers? A. Rhizopus, earthworm and protozoa B. Mushroom, rhizopus and bacteria C. Bacteria, earthworm and nematodes D. Earthworm, sedges and platyhelminthes.
33. The correct order in a food chain involving the organisms (1) grasses, (2) hawks, (3) Snakes, (4) grasshopper, (5) lizards is A. 12345 B. 54321 C. 14532 D. 32451
34. The organism with the least number of individuals in a pyramid of numbers are the A.

- secondary consumers B. tertiary consumers C. primary producers D. primary consumers
Use the list of biomes below to answer questions 35 and 36.
1. Desert 2. Rain forest 3. Southern Guinea savannah 4. Northern Guinea savannah
35. A biome with a low annual rainfall, few scattered trees within dense layer of grasses and found in Kano and Katsina states is A. I B. 2 C. 3 D. 4
36. A biome where there are many cacti and the small mammals undergo aestivation for long periods is A. I B. A C. 3 D. 4
37. Ecological succession ends with the formation of a Stable A. niche B. Population C. pioneer community D. climax community
38. In a drought situation, plants suffer from water stress which could result in A. reduced biochemical activities B. enhanced chemical activities C. enhanced microbial activities D. reduced phototropic activities
39. The water retention capacity of a soil indicates its A. fertility B. Capillarity C. aeration level D. pH level.
40. People who suck petrol with their mouths run the risk of increasing in their blood the concentration of A. iron B. Lead C. calcium D. Magnesium
41. The differences and similarities among living things account for A. diversity B. Stability C. competition D. Evolution
42. People with sickle-cell anaemia have haemoglobin A. Sand are homozygous recessive B. A and are heterozygous recessive C. Sand are heterozygous recessive D. A and are homozygous recessive
43. In the gene locus for eye colour in humans, the allele for brown eyes is dominant over the allele for blue eyes. If a homozygous brown-eyed girl has a brother with blue eyes, what are the likely phenotypes of their parents' eye colour? (Eye colour is not a sex linked trait) A. Both parents have blue eyes B. Their father has blue eyes and their mother has brown eyes C. Both parents have brown eyes D. Their mother has blue eyes and their father has brown eyes
44. If a woman's genotype is Tt Qq Rr, what would be the gene content of her egg? A. TQr, tqr B. TQR, tqr C. TqR, tQr D. TQR, TQR
45. The sex-linked defect in which very slight cut produces severe bleeding is known as A. anaemia B. Anorexia C. haemophilia D. Haemolysis
46. A man who has the trait for colour blindness marries a normal woman. What percentage of their children would be sufferers, carriers and normal respectively? A. 25%, 25% and 50% B. 25%, 50% and 25% C. 50%, 25% and 25% D. 25%, 37.5% and 37.5%
47. Breathing root is an adaptation for survival in the A. mangrove swamp B. Desert C. arboreal habitat D. Savanna
48. Red coloration on the head of a male lizard helps it to A. mark its territory B. camouflage in the environment C. secure its mate D. defend itself
49. A phenomenon by which an animal goes into a state of dormancy during the dry season is called A. hibernation B. aestivation C. incubation D. Deactivation
50. The anatomical evidence usually used in support of the evolutionary relationship among whales, humans, birds and dogs is the possession of A. thick skin B. pentadactyl limb C. tail D. epidermal structures

U.M.E BIOLOGY 1994 SOLUTION

- B** - The membrane that surrounds the vacuole is known as the tonoplast
- C** - Viruses share the characteristics of both living and non-living things. When present in living cells, viruses are living; when present in non-living media, they assume non-living crystalline form.
- D** - Green plants are autotrophic i.e. they can manufacture their own food.
- D** - The movement of gut muscle and the grinding effect of the gizzard results in the formation of casts.
- C** - Schizophyte → Thallophyte → Bryophyte → Pteridophyte → Spermatophyte
- C** - In protozoans, the function of osmoregulation is carried out by the contractile vacuole.
- A** - The antenna (part labeled I) is used for feeling
- A** - The mouthpart of a cockroach is adapted for biting and chewing.
- A** - Bony fishes have bony skeleton while cartilaginous fishes have cartilaginous skeleton. Notable gill slits is a feature of cartilaginous fishes.
- A** - The possession of a streamlined body is a feature that enhances aquatic life.
- A** - The root hair (labeled as "I") enables the plant to absorb water from the soil.
- A** - The endodermis (also known as the starch sheet) is the part that stores starch.
- C** - All these are symptoms of potassium deficiency.
- D** - This is the dental formula of a dog.
- A** - Nitrosomonas converts ammonia or ammonium compounds to nitrite while nitrobacter converts nitrite to nitrate.
- D** - Ptyalin works in saliva, which is an alkaline medium. Thus, increase in the concentration of acid will decrease the activity of ptyalin.
- A** - Apart from its role in food conduction, the phloem parenchyma also provides strength and support to the plant (not only the stem) and also serves for food storage.
- D** - The process by which a red blood cell placed in distilled water (or any solution that is hypotonic to its content) absorbs water until it bursts and releases its contents into the surrounding is known as hemolysis.
- D** - The experiment is designed to compare the rates of respiration in plants and animals.
- C** - It is known as the monometer.
- D** - A circulatory system is said to be closed if it does not allow mixing of oxygenated and deoxygenated blood.
- A** - Carbondioxide, water and oxygen are excreted through the stomata and lenticels.
- B** - This is the diagram of thoracic vertebra.
- B** - The part labeled "ii" is the neural arch.
- C** - Meiosis occurs in sex cells. It occurs during the formation of egg and sperm cells (which clearly occurs before fertilization).
- C** - The receptacle or thalamus is a base onto which the different parts of a flower are attached.
- B** - In a myopic eye, the images of distant objects are located in front of the retina.
- C** - It is clearly visible (from the graph) that the body temperature of the dog does not vary with that of the external environment while that of a lizard does.
- D** - The medulla oblongata controls many involuntary movements like heartbeat and those movements associated with breathing.

- B** - Since it involves different species of organisms, it indicates a community.
- C** - Temperature, rock and water constitute physical factors.
- B** - Rhizopus, mushroom and bacteria are all decomposers. They act on the remains of plants and animals and their waste products, converting them into nutrients for plant use.
- C** - The right food chain will be: Grasses → grasshopper → Lizards → snakes → snakes → hawks
- B** - The number of individuals in a pyramid of numbers decreases as we move across the food chain. Thus, the tertiary consumers will be the fewest.
- D** - All these features describe the Northern Guinea Savannah.
- A** - Aestivation is an adaptation to survive hot dry conditions.
- D** - The formation of a stable climax community is the final stage of ecological succession.
- A** - Shortage of water can lead to a reduction of biochemical activities since water is the medium for all biochemical reactions in the body.
- B** - Capillarity of a soil is a measure of how water moves through a soil sample. Thus, it indicates the water-retention ability of a soil.
- B** - This is because tetraethyl lead is used as an anti-knock agent for petroleum.
- A** - The differences and similarities among living things explain why there are so many species of living organisms.
- C** - People with sickle-cell anaemia have s-shaped haemoglobin. Also, sickle-cell anaemia is a homozygous recessive trait.
- C** - This will mean both parents have allele for blue eyes but are phenotypically brown-eyed since brown is dominant.
- B** - The gene content of the woman's egg will be TQR or tqr.
- C** - The condition in which very slight cut produces severe bleeding is known as haemophilia.
- No Correct Option**

Let the genotype of the colour blind man be X^nY and that of the normal woman be X^NX^N .



Thus, all the males will be normal while all the females will be carriers i.e. no sufferer.

- A** - In mangrove swamp, the soil is always water logged and thus has low oxygen content. Therefore, mangrove swamp's plants must have breathing roots.
- C** - Red coloration on the head of a male lizard helps it to attract female lizards.
- B** - A phenomenon by which an animal goes into a state of dormancy during the dry season is called aestivation.

B - The pentadactyl limb arrangement is an anatomical evidence for the evolutionary relationship among whales, humans, birds and dogs.

BIOLOGY U. M. E. 1993

- On what structures are the units of inheritance situated? A. Golgi bodies B. Ribosomes C. Chromosomes D. Endoplasmic reticulum
- Production of naked seeds is a distinctive feature of the group of plants called A. grasses B. Conifers C. legumes D. Palms

- In which of these features do bryophytes differ from pteridophytes? A. Absence of flower B. Alternation of generation C. Dependence on water for reproduction D. Presence of a vascular system.
- Which of the following organs or cell components are common to both the sporophyte and gametophyte of a fern? A. Rhizoids B. Roots C. Chloroplasts D. Leaves
- In which of the following organisms does a single cell perform all the functions of movement, nutrition, growth, excretion and photosynthesis? A. Paramecium C. Amoeba B. Euglena D. Spirogyra
- In which of the following organisms would glycogen be stored? A. Spirogyra B. Chlamydomonas C. Rattus D. Magnifera
- The most successful group of animals in terms of diversity of species is A. mollusca B. Arthropoda C. mammalia D. Playthelminthes
- Flamecells are the A. excretory system of worms B. excretory and respiratory systems of flatworms C. secretory system of flatworms D. excretory system of flatworms
- The spores of mucor are dispersed by A. water B. wind C. Insects D. explosive mechanism

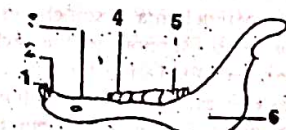
Use the figures below to answer questions 10 and 11



Stages of development of a toad

- Which of the following is the correct order of the developmental stages? A. 1 → 2 → 3 → 4 → 5 B. 5 → 1 → 3 → 2 → 4 C. 2 → 1 → 3 → 4 → 5 D. 5 → 3 → 2 → 1 → 4
- Stage 3 breathes A. With the lungs B. with the external gill C. with the internal gills D. through the skin
- The butterfly is of great economic importance because A. of its use in scientific studies B. it sucks nectar from flowers C. it adds to the beauty of the environment D. it pollinates flowers of crops and other plants
- Manufactured food in the plant is transported through the A. xylem B. Phloem C. cambium D. Cortex
- Interveneal chlorosis is normally associated with the deficiency of A. magnesium B. Potassium C. iron D. Calcium
- Osmic acid boiled with a solution of food substance gave a black precipitate. This indicates the presence of A. fats and oils B. Proteins C. amino acids D. Starch

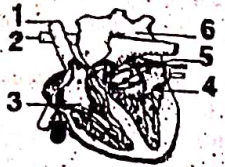
Use the figure to answer questions 16 and 17



The lower jaw of a mammal

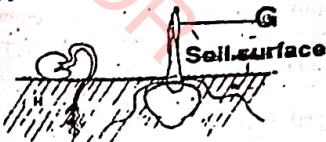
- Which of the labeled parts is the diastema? A. 2 B. 3 C. 4 D. 6
- This lower jaw is typical of a A. sheep B. Rabbit C. dog D. Cat
- The end products of the digestion of fats and oils in mammals are A. maltose and fatty acids B. amino acids and glucose C. fatty acids and fructose D. Fatty acids and glycerin

Use the diagram below to answer questions 19 and 20.



The mammalian heart

19. Blood is pumped into the right ventricle by the contraction of the auricle wall through A. 1 B. 3 C. 5 D. 6
20. After circulation in the lungs the blood returns to the left auricle through A. 1 B. 4 C. 5 D. 6
21. The main function of blood in mammals is to transport A. excretory materials from tissues B. carbon dioxide from lungs to tissues C. digested food from all the body tissues D. oxygen to the lungs
22. Members of the phylum protozoa use the contractile vacuole A. to remove excess food B. for movement C. for digestion D. to remove excess water
23. The response shown by the tips of the root and shoot of a plant to the stimulus of gravity is A. haptotropism B. Phototropism C. Hydrotropism D. Geotropism
24. Which of the following is the correct order of the vertebrae along the spinal column? A. Axis → atlas → thoracic → lumbar → cervical → sacral B. Atlas → cervical → axis → thoracic → lumbar → sacral C. Atlas → axis → cervical → thoracic → lumbar → sacral D. Axis → atlas → cervical → thoracic → sacral → lumbar
25. Which of the following is TRUE of the process of conjugation in Paramecium? A. Micronucleus disintegrates B. Each ex-conjugant divided only once C. Micronucleus undergoes division D. Each Micronucleus divides twice
26. The bright colours of the comb and feathers in the peacock are for A. Sex differentiation B. Beauty C. courtship D. Defence
27. The main function of the petal of a flower is to A. attract pollination agents B. protect the flower while still in bud C. serve as landing stage for insects D. protect the inner parts from desiccation
28. In the mammal, the autonomic nervous systems consists of A. sympathetic systems B. brain and spinal nerves C. brain and cranial nerves D. spinal cord and spinal nerves
- Use the diagram below to answer questions 29 and 30



Germination of seeds

29. In H, the cotyledons are carried above the soil because A. the epicotyls grows faster than the hypocotyls B. the hypocotyl grows faster than the epicotyls C. both grow at the same rate D. The epicotyl outgrows the radical
30. The function of the structure, labeled G is to A. carry out initial photosynthesis for the seedling B. protect the young leaves from mechanical damage C. protect the young leaves from sunlight D. protect the young leaves from insect pests
31. When it is cold, the blood vessels of the skin A. dilate to increase the amount of blood flowing to the skin B. constrict to reduce the amount of blood flowing to the skin C. dilate to reduce the

- amount of blood flowing to the skin D. constrict to increase the amount of blood flowing to the skin
32. Which path does sound entering the human ear follow? A. Oval window → ossicles → ear drum B. Ear drum → over window → ossicles C. Ear drum → ossicles → oval window D. Ossicles → ear drum → oval window
33. What would happen to a man whose pancreas has been surgically removed? A. The level of blood sugar would increase B. The glycogen content of the liver would increase C. His blood pressure would decrease. D His weight would increase appreciably
34. Carnivorous plants are usually found in areas A. which are deficient in nitrate B. which are deficient in oxygen C. with low pH D. where insects are abundant
35. What is the term used to describe the sum total of biotic and abiotic factors in the environment of the organism? A. Habitat B. Biome C. Ecosystem D. Ecological niche
36. Important abiotic factors which affect all plants and animals in the habitat are A. temperature and turbidity B. rainfall and relative humidity C. salinity and wind direction D. temperature and rainfall.
37. The most important physical factor which affects an organism living in the intertidal zone of the seashore is A. pH B. salinity C. wave action D. Temperature
38. At which trophic level would the highest accumulation of a non-biodegradable substance occur? A. primary producers B. tertiary consumers C. primary consumers D. secondary consumers
39. Two organisms of different species, living in close association but not dependent on each other are referred to as A. parasites B. commensals C. symbionts D. Autotrophs
40. Which of the following instrument is Not used in measuring abiotic factors in any habitat? A. Microscope B. Thermometer C. Hygrometer D. Wind vane
41. Plants adapted for life in salty marsh are called A. hydrophytes - B. xerophytes C. halophytes D. Epiphytes
42. Which group of plants would be the first colonizers in an ecological succession changing rocks to soil? A. Mosses B. Ferns C. Lichens D. Grasses
43. Soil fertility can be conserved and renewed by A. yearly monocropping B. crop rotation and cover crops C. bush burning to remove unwanted debris D. avoiding artificial manures
44. What ecological condition favours the breeding of black flies? A. fresh water habitat B. water in ponds and swamps C. water in small containers D. fast flowing streams
45. Carbon monoxide poisons tissues by A. constricting the blood vessels B. killing the cells C. combining with haemoglobin D. rupturing the blood vessels
46. Which of the following is an example of discontinuous variation observed in man? A. Skin colour B. Tongue rolling C. Body weight D. Height

Gamete from the other Parent

S	SS	Ss
s	sS	ss

S = smooth
s = wrinkled

Gamete from one Parent

47. During blood transfusion, agglutination may occur when A. contrasting antigens react with contrasting antibodies B. similar antigens react with similar antibodies C. Two different antigens react with each other D. Two different antibodies react with each other
48. In the illustration above, the genotypes of the offspring are A. 1 heterozygous smooth:2 homozygous smooth : 1 wrinkled B. 1 heterozygous smooth :2homozygous smooth :1 wrinkled C. 2 heterozygous smooth: wrinkled D. 1 heterozygous smooth :1 wrinkled
49. Cold blooded animals are referred to as A. poikilothermic B. Homoiothermic C. polythermic D. Homeostatic
50. Which of the following organisms has lost the pentadactyl limb structure? A. Bat B. Fish C. Frog D. Pigeon

1993 U.M.E BIOLOGY SOLUTION

1. C - Genes, which are the units of inheritance, are situated on the chromosomes.
2. B - Spermatophytes are divided into angiosperms and gymnosperms (conifers). Angiosperms produce seeds that are enclosed while gymnosperms produce naked seeds.
3. D - Pteridophytes have vascular system while bryophytes do not.
4. C - Both sporophyte and gametophyte do photosynthesize, thus, they both possess chloroplast.
5. B - The word 'photosynthesis' alone will eliminate paramecium and amoeba as they are animals and as such do not photosynthesize. For spirogyra, it must be noted that the organism is not unicellular. The only organism that satisfies all the conditions given here is Euglena.
6. C - Starch is the form in which carbohydrate is stored in plants. Animals and fungi, on the other hand, store carbohydrate as glycogen.
7. B - The arthropod constitutes the most successful group of organisms as they have adapted to various environmental conditions.
8. D - Flame cells are the excretory structures in flatworms.
9. B - The spores of mucor are dispersed by wind.
10. D - Egg state → internal gill stage → external gill stage → development of the forelimb → development of the hind limb.
11. C - Stage "3" represents the internal gill stage. Thus, the organism breathes with internally located gills.
12. D - Butterflies are good agents of pollination
13. B - Manufactured food in a plant is transported through the phloem. Xylem transports water from the root to other parts of the plant.
14. A - Interveinalchlorosis occurs as a result of magnesium deficiency.
15. A - Osmic acid is used to test for fats and oils.
16. B - The part labeled "3" is the diastema. The diastema is a space created by the absence of canine in the jaw of a herbivore.
17. A - Possession of a diastema is a feature of herbivores e.g, sheep.
18. D - The end products of the digestion of fats and oils in mammals are fatty acids and glycerols.
19. B - Blood is pumped into the right ventricle by the contraction of the walls of the right auricle.
20. D - After circulation in the lungs, the blood returns to the left auricle through the pulmonary vein.

21. A - The mammalian blood transports excretory materials from tissues for them to be discarded. It also supplies the body cells with oxygen and food substances.
22. D - Protozoans use contractile vacuole for osmoregulation.
23. D - The response of plants to the stimulus of gravity is known as geotropism.
24. C - The first cervical bone is atlas, followed by axis and then the five normal cervical bones; followed by the thoracic, lumbar, sacral and finally the caudal vertebrae.
25. D - During conjugation in paramecium, each micronucleus divides twice.
26. C - The bright colours of the comb and features in the peacock are for courtship.
27. A - Petals attract the agents of pollination since they are brightly coloured.
28. A - The autonomic nervous system consists of the sympathetic nervous system and the parasympathetic nervous system.
29. B - This is epigeal germination. It occurs when the hypocotyls grow faster than the epicotyls, causing the cotyledons to be carried above the soil.
30. B - The structure labeled "G" is the coleoptiles, it protects the young leaves from mechanical damage.
31. B - When it is cold, the blood vessels of the skin constrict to reduce the amount of blood flowing to the skin. This helps to reduce the amount of heat being given off.
32. C - It passes from the auditory canal to the ear drum and then to the ear ossicles and subsequently to the oval window.
33. A - The pancreas produces insulin and glucagon that regulate the blood sugar level.
34. A - Carnivorous plants are usually found in areas which are deficient in nitrate. They trap insects to supplement their food. In other words, carnivorous plants kill insects just to get nitrogen.
35. C - The ecosystem consists of the living things interacting with their non-living environments.
36. D - Temperature and rainfall are the most important abiotic factors.
37. C - The intertidal zone of the seashore is exposed to wave actions.
38. B - As we move across the food chain, the amount of non-biodegradable materials increases.
39. D - Technically speaking, no option is correct. But again, two different or similar species living closely will never depend on each other if they are both autotrophic.
40. A - The microscope is not used for measuring any abiotic factor. The thermometer is used for measuring temperature, the hygrometer is used for measuring relative humidity while the wind vane is used for measuring wind direction.
41. C - Plants that are adapted to salty environments are called halophytes.
42. C - Lichens are the first colonizers in an ecological succession changing rocks to soil.
43. B - Crop rotation and planting of cover crops help to conserve and renew soil fertility.
44. D - Black flies breed in fast flowing streams.
45. C - Carbon monoxide combines with haemoglobin, thereby cutting short the supply of oxygen.
46. B - Tongue rolling is a discontinuous variation while skin colour, body weight and height are continuous variations.
47. A - Agglutination occurs when contrasting antigens and antibodies react.

48. B - One (SS) is homozygously smooth, two (Ss) are heterozygously smooth while one (ss) is homozygously wrinkled.
49. A - Cold blooded animals are said to be poikilothermic while warm blooded animals are homoiothermic.
50. B - The pentadactyl limb arrangement is absent in fishes.

BIOLOGY U.M.E 1992

1. The organelle involved in tissue respiration is the A. endoplasmic reticulum B. ribosome C. Golgi body D. Mitochondrion
2. A tissue can best be defined as A. an aggregate of similar cells B. an aggregate of cells performing a similar function C. an aggregate of similar cells performing the same function D. a mixture of different cell types performing the same function.
3. Which of the following correctly summarizes the life cycle of a fern plant? A. Spore prothallus thallus sporangium B. Male and female gametangia zygospore sporangium spores C. Spore thallus spermatozoid ovum sporangium D. prothallus spermatozoid egg cell leafy plant sporangium spores
4. A major difference between platyhelminthes and coelenterates is that platyhelminthes A. are multicellular B. have developed a mesoderm C. reproduce sexually D. reproduce asexually
5. The essential structural difference between Hydra and tapeworm is that while hydra A. has tentacles, tapeworm is parasitic B. is diploblastic, tapeworm is triploblastic C. has a mouth, tapeworm feeds by suckers D. has mesoderm, tapeworm has mesogloea
6. The flowering period of plants in a habitat is determined by the A. duration of sunlight B. intensity and duration of rainfall C. relative humidity of the atmosphere D. temperature of the habitat

Use the figure below to answer questions 7 and 8



- The structure labeled X is used by the organism in the same way as man uses his A. oesophagus B. Trachea C. stomach D. intestine
8. The structure labeled Y is the A. food vacuole B. nucleolus C. Macronucleus D. contractile vacuole
9. Which of the following insects undergoes incomplete metamorphosis? A. Mosquito B. Termite C. Housefly D. Moth
10. An onion is a bulb because it A. has a tuberous stem B. has a reduced stem and thick fleshy leaves C. has adventitious roots D. bears many buds at the nodes
11. The flow of air and water in or out of the mesophyll layer of a leaf is controlled by the A. stomata B. lenticels C. airspaces D. guard cells
12. Fungi are heterotrophic because they A. have no leaves B. lack roots C. are filamentous D. lack chlorophyll
13. The major site of photosynthesis in the leaf is the A. palisade parenchyma B. mesophyll parenchyma C. upper epidermis D. lower epidermis
14. 5cm³ dilute sodium hydroxide solution and 5cm³ one percent copper sulphate solution are added to a solution of food specimen. The purple

colour which is observed shows the presence of A. glucose B. starch C. fat D. Protein

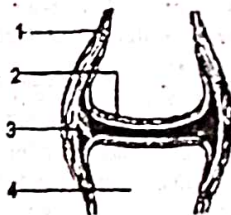
15. The blood vessel which carries blood from the alimentary canal to the liver is the A. hepatic artery B. hepatic vein C. hepatic portal vein D. mesenteric artery
16. Gaseous exchange in Aves occurs in the A. tracheoles B. bronchi C. air sacs D. Trachea
17. In the absence of oxygen, the pyruvic acid produced during glycolysis is converted to CO₂ and A. water B. Glycerol C. ethanol D. citric acid.
18. The excretory organ in insects is the A. kidney B. malpighian tubule C. flame cell D. nephridium

Use the figure below to answer questions 19 and 20

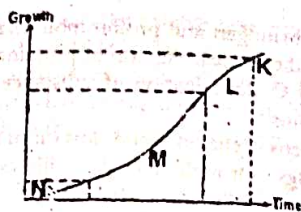


- The structure labeled 5 is the A. sweat gland B. sebaceous gland C. blood vessel D. nerve fibre.
20. Melanin and keratin are produced in the part labeled A. 2 B. 3 C. 4 D. 5
21. The bone of the neck on which the skull rests is known as A. odontoid process B. axis C. atlas D. occipital condyle
22. Which enzymes are contained in the pancreatic juice? A. Ptyalin, lipase and pepsin B. maltase, erepsin and trypsin C. Rennin, sucrase and hspase D. Amylase, lipase and trypsin

Use the figure below to answer questions 23 and 24



- The part labeled '3' is the A. cartilage B. ligament C. synovial fluid D. Bone
24. The function of the part labeled 1 is to A. secrete a fluid which lubricates the joint B. Attached muscles to the bones at the joint C. bend the bones at the joint D. hold the joint in place
25. Double fertilization in higher plants is significant because it ensures the A. formation of a fertile embryo B. formation of a fertile embryo and the endosperm C. development of the seed D. development of the fruit
26. In mammalian development, the function of the yolk is to A. supply nutrients to the embryo B. acts as the shock absorber to the foetus C. supply air to the embryo D. facilitate the process of excretion in the foetus
27. Hypogeal germination is characterized by the A. Emergence of the plumule out of the ground B. provision of nourishment by the endosperm C. elongation of the hypocotyls D. elongation of the epicotyl
28. Fruits which develop without fertilization of the ovule are A. false B. Multiple C. aggregated D. Parthenocarpic



Which part of the curve represents the faster rate of growth? A. K B. L G. M. D. N

30. The grand period of growth is represented by A. N B. M C. L D. K

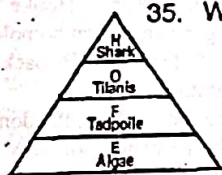
31. Neurones that receives stimuli from the body or internal organs are called A. sensory neurones B. efferent neurones C. motor neurones D. relay neurones

32. Which of the following is true of a climax community? A. it persists until the environment or climate changes. B. it changes drastically from one year to the next. C. it is the first stage in succession D. it is made up of the tallest trees and the smallest animals.

33. A population is defined as a collection of similar organisms that A. Be have in the same way B. interbreed freely C. are found in the same habitat D. eat the same food

34. In a typical predator food chain involving secondary and tertiary consumers, the organisms become progressively A. smaller and more numerous along the food chain B. equal in number and size along the food chain C. larger and fewer along the food chain D. parasitized along the food chains consumers get bigger

Use the figure below to answer questions 35 and 36.



35. Which level of the pyramid has the least total stored energy? A. E B. F C. G D. H

36. Which organism in the pyramid functions as a tertiary consumer? A. Algae B. Shark C. Tadpole D. Tilapia

37. Mangrove swamp can be found A. on a sea shore with flat terrain B. where a river meets the sea C. on a mud flat near the sea D. where two rivers meet

38. Soil With the finest particles is called A. silt B. Clay C. Sand D. Gravel

39. Malaria symptoms are caused by A. toxins released into the blood as a result of the destruction of red blood cells B. The multiplication of the malarial sporozoites in the liver C. the invasion of the red blood cells by the trophozoites D. the development of merozoites into gametocytes

40. Which of the following is true of the children of a haemophilic man who marries a woman that is not haemophilic and does not carry the trait? A. All their sons will be haemophilic B. All their daughters will be haemophilic C. All their daughters will be carriers D. All their sons will be carriers

41. A child with blood group genotype different from those of both parents and with a mother of genotypes OO, can only have a father of genotypes A. A B. B C. AB D. OO

42. If R and r denote the genes for a character, the offsprings of the cross between RR and Rr are A. RR, 2Rr, rr B. 2RR, 2r 2RR, 2Rr D. 4Rr

43. A mammal with red fur and long ear was crossed with another having white fur and short ears. If the offspring had red fur and short ears, then

the A. characters are linked B. characters are not linked C. parents are related D. parents are not related.

44. Pawpaw seeds collected from a tree with many desirable agronomic qualities did not give rise to plants of desirable characters as the parent because A. seeds are not reliable for propagating plants B. uncontrolled out - crossing can introduce unwanted variability C. vegetative propagation is the best form of reproduction for all crops D. seeds were not physiologically mature at harvest

45. Women do not suffer from colour blindness because A. the trait is sex-linked B. only men are colour blind C. the genes are recessive and sex-linked D. the genes occur on both the X and Y chromosomes

46. The hereditary material of the cell is A. the RNA B. Protein C. the DNAD. Carbohydrate

47. An example of plant adaptation to a xerophytic environment is represented by the development of A. Fleshy tissues and reduced leaves B. broad canopy and extensive surface root system C. thick barks and broad leaves D. rough leaves and shallow root system

48. Which of the following factors is LEAST likely to affect the animals living in a fresh water habitat? A. Turbidity B. Temperature C. pH D. Salinity

49. The theory of natural selection was developed by A. Lamarck and Darwin B. Darwin and Wallace C. Wallace and Mendel D. Mendel and Lamarck

50. Fossil records found in sedimentary rocks offer some explanation for the theory of evolution because A. the deposits have remains of organism characteristic of when they were formed B. different strata have remains of organism of the same kind C. only organisms with strong parts are fossilized D. most animal and plant fossils bear little resemblance to present day living specimens

1992 U.M.E BIOLOGY SOLUTION

1. D - The organelle that is involved in tissue respiration is the mitochondrion. The mitochondrion is the power house of the cell.

2. B - A tissue can best be defined as an aggregate of cells performing a similar function.

3. D - Prothallus → Spermatozoid + egg cell → Leafy plant → Sporangium → Spores

4. B - Platyhelminthes, as normal triploblastic animals, have well developed mesoderm. Coelenterates have a poorly developed region called mesogloea instead.

5. B - Hydra is diploblastic while tapeworm is triploblastic.

6. A - The following period of plants is determined by the duration of sunlight

7. A - The structure labeled X is the gullet. Both the gullet and the oesophagus in man are used for swallowing food.

8. C - 'Y' is known as the macronucleus or meganucleus.

9. B - Termites undergo incomplete metamorphosis. Other insects which undergo incomplete metamorphosis are praying mantis, cockroach, crickets, lice, grasshoppers etc.

10. B - An onion is a bulb because it has a reduced stem and thick fleshy leaves.

11. D - The guard cell controls the opening and closing of the stomata. Air and water move in and out of the mesophyll of a leaf through the stomata.

12. D - Fungi are heterotrophic because they lack chlorophyll and as such are not capable of manufacturing their own food.

13. A - The palisade parenchyma of the leaf is the major site of photosynthesis. The palisade parenchyma is the upper layer of ground tissue in a leaf consisting of elongated cells beneath and perpendicular to the upper epidermis.

14. D - This is the description of the Biuret's test for protein.

15. C - The hepatic portal vein, the only blood vessel which begins with and ends in capillaries, transports blood from the alimentary canal to the liver.

16. C - Lungs are the respiratory organs in birds (aves). Alveoli (air sacs) are the terminal part of a lung.

17. C - In the absence of oxygen, the pyruvic acid (formed from glycolysis) is converted to lactic acid in animals or ethanol carbon dioxide in plants.

18. B - The malpighian tubule is the excretory organ in insects, kidney is for mammals, flame cells are for flatworms while nephridium is for annelids.

19. A - The structure labeled "5" is the sweat gland.

20. A - The malpighian layer contains melanin and keratin. The part labeled '2' is the malpighian layer.

21. C - The bone of the neck on which the skull rests is the atlas, which is the first cervical vertebra.

22. D - The pancreatic juice contains amylase, lipase and trypsin.

23. C - The part labeled '3' is the synovial fluid. It lubricates the joint and thereby reduces friction and shock.

24. D - The part labeled '1' is the ligament. A ligament holds two bones together at a joint.

25. B - The second fertilization is to produce the endosperm.

26. A - The yolk provides food for the embryo.

27. D - In hypogeal germination, the epicotyl elongates, thereby leaving the cotyledon in the soil.

28. D - Fruits that develop without the fertilization of the ovule are said to be parthenocarpic.

29. C - The fastest rate of growth is represented by 'M'.

30. A - The grand period of growth is 'N'.

31. A - The sensory or afferent neurons receive stimuli from the body or internal organs.

32. A - The climax community persists until the environment or climate changes.

33. B - A population is a collection of similar organisms that interbreed freely.

34. C - Not only in a predator food chain, organisms normally become larger and fewer in number as we move across the trophic levels.

35. D - As we move up the pyramid of energy, the available energy decreases.

36. B - Here, algae serves as the producer, the tadpole is the primary consumer, Tilapia, the secondary consumer while the Shark serves as the tertiary consumer.

37. C - Mangrove swamp is a wet and spongy area of land in tropical climates and along coastal regions.

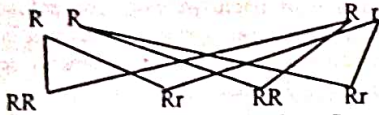
38. B - Soil with the finest particles is the clay while the one with the most coarse texture is the gravel.

39. A - Malaria symptoms are felt when the erythrocytes burst and consequently release toxins into the blood.

40. C - All the sons will be normal while all the daughters will be carriers of the sickle-cell trait.

41. C - The child will only have A or B if the father has AB, since the mother is OO.

42. C -



The offspring will be two RR and two Rr.

43. B - Since the characters are not inherited together, they are not linked. If they were inherited together, the offspring would either have red fur and long ears or white fur and short ears.
44. B - Outbreeding introduces blending of different characters.
45. C - Colour blindness is a sex-linked recessive trait. A woman will only be affected if both X - chromosomes are defective.
46. C - The hereditary material of the cell is the deoxyribonucleic acid (DNA).
47. A - Xerophytic plants are those plants that grow in an environment with very little amount of water (desert). Thus, adaptations for water conservation are very important. Possession of fleshy tissue enhances water storage while reduced leaves reduce transpiration rate.
48. D - Salinity only affects animals that live in salty aquatic environment.
49. B - The theory of natural selection was developed by Charles Darwin and Alfred Wallace.
50. A - Fossil records provide substantial explanation for the theory of evolution because deposits always have remains of organisms present during their period of formation.

BIOLOGY U. M. E 1991

Use the figure below to answer questions 1 and 2.

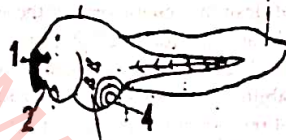
1.



Animal Cell

- Which of the following structures is associated with aerobic respiration A. 1 B. 2 C. 3 D. 4
2. The structure labeled 5 is used for
A. protein synthesis B. energy production C. secretion D. excretion
3. Angiosperms and gymnosperms belong to the plant group known as A. schizophyta B. bryophyte C. pteridophyta D. Spermatophyta
4. Which of the following are non-green plants?
A. Euglena B. Fungi C. Spirogyra D. Angiosperms
5. Sting cells are normally found in A. flatworms B. Hydra C. snails D. Angiosperms
6. Which of the following are differentiated into true root, stems and leaves? A. Algae B. Schizophyta C. Pteridophyta D. Bryophyta
7. To facilitate gaseous exchange, breathing roots have A. stomata B. mitochondria C. cuticle D. lenticels
8. The annulus of fern sporangium helps in A. spore dispersal B. conduction of mineral salts C. trapping of light energy D. water retention
9. One of the features which adapts Paramecium to its environment is the possession of A. a regular shape B. two nuclei C. cilia D. a pellicle
10. In the earthworm, the cocoon is secreted by the A. chaeta B. prostomium C. peristomium D. clitellum
11. The function of maxillipeds in the crayfish is to aid A. walking B. swimming C. feeding D. respiration

12. The respiratory organ in the land snail is the A. radula B. mantle C. entacle, D. foot
Use the figure below to answer questions 13 and 14.



- The structure labeled 4 is for A. feeding B. attachment C. excretion D. respiration
14. As the tadpole develops, the structure labeled 5 A. grows longer B. becomes shorter C. becomes the hind legs D. remains unchanged
15. The gill rakers of fishes take part in A. feeding B. respiration C. swimming D. Diffusion
16. A wide pith with a ring of conducting tissue is characteristic of the root of A. sunflower B. maize C. bean D. okra
17. Which of the following is formed immediately after the first product of photosynthesis? A. Lipid B. Starch C. Oxygen D. Sugar

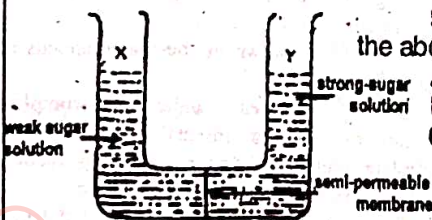
Use the figure below to answer questions 18 and 19.



Dissection showing the Abdominal Cavity of a rat

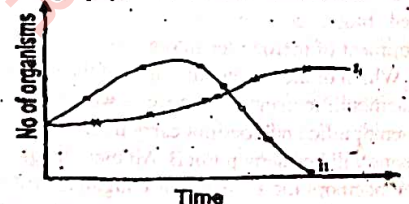
- In the digestive system, absorption of nutrients into the blood takes place in the part labeled A. 1 B. 2 C. 3 D. 4
19. The gland which products trypsin, amylase and lipase is labeled A. 6 B. 4 C. 2 D. 1
20. One of the accessory organs of the digestive system is the A. kidney B. Spleen C. liver D. lung
21. The element common to protein, carbohydrate and lipid is A. hydrogen B. sulphur C. nitrogen D. phosphorus
22. The crown of the mammalian tooth is covered with A. cement B. dentine C. caries D. enamel
23. In living cells, insufficient oxygen may cause a breakdown of glucose into A. fatty acids B. lactic acids C. glycogen D. carbon dioxide
24. Which of the following can bring about the greatest increase in the rate of transpiration? A. Increased humidity B. Reduced temperature C. Reduced wind speed D. Reduced humidity.

Use the figure below to answer questions 25 and 26



25. After 30 minutes, the level of sugar solution in the above figure will A. rise in X only B. rise in Y only C. be the same in X and Y
26. The process by which water moves from X to Y through the semi-permeable membrane is called A. diffusion B. osmosis C. active diffusion D. Osmoregulation

27. Fibrinogen and prothrombin play important roles in the A. deamination of proteins B. clotting of blood C. defoixication of substances D. storage of vitamins.
28. Deoxygenated blood flows into the right and left lungs through the A. pulmonary vein B. venacava C. pulmonary artery D. subclavian vein
29. Which of the following is a plant excretory product? A. Oil B. Cytokinin C. Resin D. Aminoacids.
30. The movement of the whole organism to an external stimulus is termed A. tropism B. ataxis C. a nastic movement D. a phototrophic movement
31. Which of the following vertebrae lacks a centrum? A. Atlas B. Axis C. Thoracic D. Lumbar.
32. The function of the epididymis in mammals is the A. expulsion of urine B. storage of sperms C. circulation of blood D. activation of sperms
33. A collection of achenes formed from several carpels of a flower is A. a multiple fruit B. an aggregate fruit C. a schizocarp D. a simple fruit.
34. Vegetative propagation is described as asexual reproduction because A. reproductive organs are not involved B. new individuals are not formed C. many new plants are produced D. there is no exchange of genetic materials
35. Epigeal germination can be found in A. sorghum B. maize C. millet D. groundnut
36. A dwarf plant can be stimulated to grow to normal height by the application of A. thyroxin B. gibberellins C. insulin D. Kinin
37. The greatest contribution to genetic studies was made by A. Thomas Morgan B. Gregor Mendel C. Charles Darwin D. Robert Hooke
38. The exchange of genes between homologous chromosomes is called A. test cross B. back cross C. crossing-over D. mutation
39. When two heterozygotes mate, the dominant trait will appear in A. the F₁ generation only B. the F₂ generation only C. both the F₁ and F₂ generations D. Neither the F₁ nor F₂ generation
40. Which of the following characters is NOT sex-linked? A. River blindness B. Baldness C. Haemophilia D. Colour blindness
41. The most important factors which influence an Organism's way of life in its habitat are A. the physical and biotic environment B. food and water availability C. temperature, water, light and predator-prey relationship D. competition for food and space
42. Organisms in an ecosystem are usually grouped according to their trophic level as A. carnivores and epiphytes B. consumers and parasites C. producers and consumers D. producers and saprophytes B. maize D. Groundnut



43. The above diagram represents a competitive interaction between organisms in communities I and II. Which of the following statements is CORRECT?
A. The population of I was higher than II at the beginning of the Experiment B. II was wiped out from the environment at the end of the experiment C. The population of II was always lower than that of I D. The population of I was lower at the end of the experiment than at the beginning

Which of the following animals has homodont dentition? A. Rat B. Man C. lizard D. Pigeon.

11. In which of the following does external fertilization take place? A. Toad. B. Lizard C. Bird. D. Cockroach.

12. In the tapeworm, the suckers on the scolex are used for A. sucking the blood of the host B. holding fast to the host C. reproduction D. locomotion.

13. A feature which adapts birds to flight is the possession of A. scaly legs B. light bones C. two walking legs D. a pointed beak

14. The nephridia in the earthworm form part of the A. reproductive system B. respiratory system C. circulatory system D. excretory system

15. Which of the following diseases is rarely spread by a housefly? A. Yellow fever B. Dysentery C. Typhoid fever D. Poliomyelitis

16. Which of the following cells is thin-walled and living at maturity? A. Collenchyma. B. Sieve tube C. Xylem vessel D. Sclerenchyma.

17. The mode of nutrition in which digestion is extra-cellular is A. holophytic B. Parasitic C. holozoic D. Saprophytic

18. The first step in the process of photosynthesis is the A. activation of the chlorophyll B. photolysis of water C. reduction of carbon dioxide D. formation of sugar

19. Which of the following food substances will produce a brick-red colour when warmed with Benedict's solution A. Glucose B. Starch C. Egg white D. Maltose

20. The organ which secretes digestive enzymes as well as a hormone is the A. liver B. salivary gland C. pancreas D. Spleen

21. The villus in the small intestine is significant because it A. increases the surface area for absorption B. increases the surface area for digestion C. assists in mixing digested food D. assists in filtering undigested food

22. If a ring of bark and phloem is removed from a stem, the A. plant dies immediately B. plant dies after two days C. movement of food is not affected D. movement of mineral salts is hardly affected

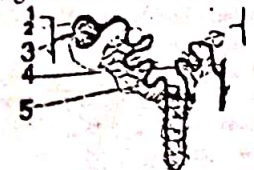
23. Transpiration can be measured with a A. photometer B. hygrometer C. potometer. D. Barometer

24. Excretory products responsible for the red, purple and blue colours of flowers are called A. alkaloids B. Tannins C. anthocyanins D. Resins

25. Etiolation is caused by the influence of A. mineral salts B. Water C. carbon dioxide D. Light

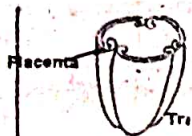
26. Muscles are indirectly attached to bones by means of A. ligaments B. Membranes C. Tendons D. Sutures

Use the figure below to answer questions 27 and 28.



Which structure is the glomerulus? A. 5 B. 3 C. 2 D. 1

28. If the blood is too concentrated, more water is absorbed from A. 5 B. 4 C. 3 D. 1



29. During mammalian embryo development, large amounts of oestrogen and progesterone

are produced in the A. umbilical cord B. amnion C. placenta D. amniotic fluid

30. The type of placentation shown in the figure above is A. parietal B. marginal C. axile D. free central

31. Fruits which develop without fertilization are described as A. simple B. parthenocarpic C. aggregate D. Compound

32. The elephant grass is propagated vegetatively by means of A. corms B. bulbs C. suckers D. stolons

Use the figure below to answer questions 33 and 34.



All the cell bodies in the spinal cord are found in A. 1 B. 2 C. 3 D. 4

34. In a reflex action impulse flows from A. 1 to 2 B. 2 to 1 C. 4 to 1 D. 4 to 2

35. The part of the ear that is concerned with balance is the A. Semi-circular canals B. Incus C. malleus D. Eustachian tube

36. In an organism where the 2n number of chromosome is 16, the number of chromosomes in each gamete will be A. 32 B. 16 C. 8 D. 4

37. What would be the result of the first filial generation (F₁) and the second filial generation (F₂) of a mono-hybrid cross between pure line normal-winged Drosophila flies and pure line Short-winged flies, if the gene for the normal wing is dominant? A. F₁ flies all short-winged and F₂ flies all normal-winged B. F₁ flies all normal-winged and F₂ flies all short-winged. C. F₁ flies all, short-winged and three-quarters of F₂ flies are short-winged D. F₁ flies all normal-winged and three-quarters of F₂ flies are normal-winged



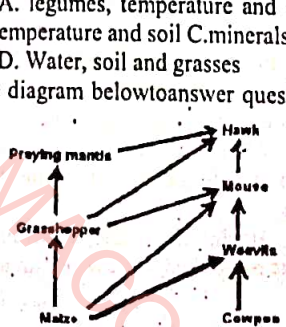
38. What stage during cell division is represented in the figure above? A. Prophase B. Metaphase C. Anaphase D. Telophase

39. An individual in the AB blood group is a universal recipient for blood donation because A. all the red blood cells do not carry antigen B. all the red blood cells carry antigen A C. all the red blood cells carry antigen B D. there are no anti-A and anti-B antibodies in the serum

40. Haemophilia results from the mutation of the genes A. in the sex chromosomes B. which control skin colour C. which control the mechanism for blood-clotting D. which control the formation of haemoglobin

41. In a savanna ecosystem, the abiotic factors include A. legumes, temperature and sandy soil B. water, temperature and soil C. minerals, oxygen and reptiles D. Water, soil and grasses

Use the diagram below to answer questions 42 and 43.



42. Which organism is an omnivore? A. Praying mantis B. Hawk C. Mouse D. Grasshopper

43. Which of the organisms will have the lowest population in an ecosystem? A. Hawk. B. Cowpea C. Praying mantis D. Mouse

44. The salinity of a brackish environment A. increases immediately after rain B. increases at the end of the rainy season C. decreases with increase in micro-organisms D. increases during the dry season.

45. Physiological adaptation to very dry condition in animals is called A. hibernation B. Aestivation C. rejuvenation D. Xeromorphism

46. Which set of diseases is spread mainly by insect vectors? A. Cholera, tinia and gonorrhoea B. Poliomyelitis, tuberculosis and syphilis C. Cholera, malaria and tuberculosis D. Malaria, cholera and river blindness.

47. Which of the following constitutes pollution? A. Droppings from birds B. Loud music C. Apack of cigarettes. D. Refuse in an incinerator.

48. An acidic soil can be improved upon by A. sedimentation B. Leaching C. flocculation D. Watering

49. What do bacteria in root nodules derive from the host plant? A. Protection and minerals B. Water and minerals C. Carbohydrates and water D. Protection and carbohydrates.

50. Free nitrogen is released to the atmosphere by A. nitrogen fixing bacteria B. nitrifying bacteria C. denitrifying bacteria D. saprophytic bacteria

1990 U.M.E BIOLOGY SOLUTION

1. A - Frankly speaking, virus is neither qualified as living nor non-living. When in non-living media, they are non-living and as such assume crystalline form. When in living cells, they behave as living organisms - they can multiply and show transmission of character to offspring.

2. C - The contractile vacuole, an organelle used for osmoregulation, is common to Amoeba and Paramecium.

3. B - Hydra has only one opening - the mouth. Both ingestion and egestion occur through the mouth.

4. D - Coelenterates (such as Hydra) reproduce sexually and asexually. The asexual mean of reproduction is known as budding.

5. C - The algae, bryophytes and pteridophytes are similar in that they require moisture for fertilization.

6. A - The spores of ferns are dispersed by wind.

7. A - In bryophytes or pteridophyte, sex organs are produced in the gametophyte.

8. C - The part labeled '3' is the auxiliary bud.

9. D - Auxins are produced from the root and stem apices.

10. B - Pisces (fishes) and reptiles (e.g. lizard) have homodont dentition while mammals have heterodont dentition.

11. A - External fertilization occurs in toad. Generally speaking, majority of fishes and amphibians show external fertilization.

12. B - The suckers are the organs of attachment to the host tissues.

13. B - Possession of light bones enhances flight in birds

14. D - The nephridium is the excretory structure of the annelids e.g. earthworm.

15. A - Yellow fever uses mosquito, not housefly, as its vector. Yellow fever is a viral disease.

16. A - Collenchyma cells are primarily thin-walled and living at maturity.

17. D - Saprophytes show extracellular digestion.

18. A - The first step during photosynthesis is the activation of chlorophyll. Here, the energy from the sun raises the energy level in the chlorophyll molecule.

19. A - A reducing sugar will produce a brick-red colour when warmed with Benedict's solution. Examples of reducing sugars are glucose, galactose, fructose, mannose, maltose and lactose. Note: sucrose is a non-reducing sugar.

20. C - The pancreas is both endocrine and digestive. The hormones produced by the pancreas are insulin and glucagon (which are used for regulating the blood sugar level). The digestive enzymes produced by the pancreas are amylase, trypsin and lipase.

21. A - The villus increases the surface area of the small intestine for absorption.

22. D - The phloem is responsible for the conduction of manufactured food from the leaves to other plant parts. Hence, the removal of phloem will affect the movement of food and not that of water and mineral salts.

23. C - The potometer is an instrument used for measuring the rate of transpiration.

24. C - Excretory products that are responsible for the red, purple and blue colours of flowers are called anthocyanins.

25. D - Etiolation (or Aetiolation) is caused by the influence of light. It occurs in plants that are grown in partial or complete absence of light.

26. A - Ligaments attach bones to bones while tendons attach muscles to bones.

27. B - The network of capillaries (labeled '3') is the glomerulus.

28. B - Selective re-absorption occurs in the part labeled '4'.

29. C - The placenta is known to exchange substance between maternal blood and foetal blood. In addition, the placenta is also an endocrine organ. It secretes large amount of hormones such as oestrogen and progesterone.

30. A - This is parietal placentation. It involves the arrangement of ovules on the sides of a syncarpous ovary with a single chamber.

31. B - Parthenocarpy is the development of fruit without fertilization. When this occurs in some animals, it is known as parthenogenesis.

32. D - The elephant grass is propagated vegetatively by means of stolons.

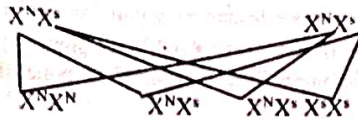
33. C - The diagram represents a typical reflex arc. The central region (the part labeled '3') is the spinal cord. Thus, it can be said that the cell bodies of the spinal cord are found in '3'.

34. A - In a reflex action, the direction of impulse is from '1' to '2'.

35. A - The semi-circular canals are associated with the maintenance of balance.

36. C - The number of chromosomes in each gamete is the haploid number (n). Thus, if the diploid number (2n) is 16, the haploid number will be 8.

37. D - Let $X^N X^N$ = pure line normal winged *Drosophila* flies and $X^N X^s$ = pure line short-winged flies.



$X^N X^N$ and $X^N X^s$ are normal-winged, $X^s X^s$ are short-winged. Thus, all F_1 flies will have normal wings while three-quarters of F_2 flies have normal wing.

38. C - The diagram portrays the anaphase of the cell division.

39. D - Blood group AB is a universal recipient because the blood lacks antibodies. Note that blood group O is a universal donor because the blood lacks antigen.

40. C - Haemophilia is a condition in which a small cut results in profuse bleeding. Thus, haemophilia can be said to result from the mutation of the genes which control the mechanism for blood clotting.

41. B - Water, temperature and soil are all abiotic factors.

42. C - Since the mouse feed on both flesh (grasshopper) and plant (maize), it is an omnivore.

43. A - In any ecosystem, the organism at the highest trophic level will have the lowest population.

44. D - Salinity refers to the amount of salt present in a body of water. Salinity increases during the dry season and decreases during the rainy season.

45. B - Aestivation is the adaptation of some animals to hot and dry condition.

46. D - Malaria is spread by female Anopheles mosquito, cholera is spread by houseflies while river blindness is spread by blackfly.

47. B - Loud disco music is a source of noise pollution.

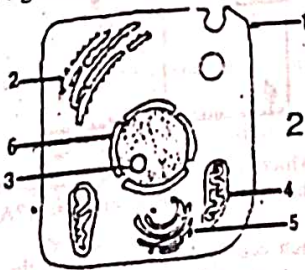
48. C - The soil can be improved upon by flocculation.

49. D - Bacteria derive food and shelter from the plant while in turn helping the plant with nitrogen fixation.

50. C - Denitrifying bacteria enhance the release of free nitrogen into the atmosphere. A good example of such bacteria is pseudomonas.

BIOLOGY U.M.E. 1989

Use the figures below to answer questions 1 to 3



1. The Structure labeled 5 is the A. Nucleolus B. Golgi body C. Mitochondrion D. Vacuole.

2. Which of the labeled parts of the cell contains ribonucleic acid? A. 1 B. 2 C. 3 D. 5

3. Which structure is known as the power house of the cell A. 6 B. 5 C. 4 D. 3

4. When a virus is placed in a non-living medium it A. becomes dehydrated B. forms spores C. forms Flagella D. becomes crystalized.

5. A characteristic of the phylum Coelenterata is that A. most of them are marine B. they possess a gut with a single opening C. they possess numerous pore on their bud D. they are bilaterally symmetrical

6. A multinucleate body without internal cell boundaries is characteristic of A. bryophytes B. fungi C. algae D. gymnosperms

7. Double fertilization is a unique feature of A. angiosperms B. bryophytes C. pteridophytes D. algae

8. Which of the following phyla have members with both internal and external segmentation? A. Platyhelminthes B. Nematoda C. Annelida D. Mollusca

9. Mineral salts can be absorbed into the roots by A. osmosis only B. osmosis and diffusion C. diffusion and active transport D. imbibition only.

10. Which of the following is a common characteristic of crustaceans? A. possession of a pair of antennae B. possession of two pairs of antennae C. Each segment has a pair of walking legs D. Four pairs of walking legs on the Cephalothorax.

11. The Pedipalpi in spiders are used for A. grasping B. walking C. feeling D. web spinning

12. The body of a snail is divided into head, thorax and abdomen B. visceral mass and abdomen C. thorax and foot D. visceral mass and foot.

Use the figure below to answer questions 13 and 14

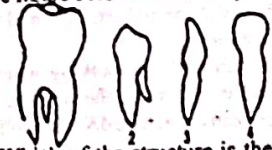


13. Which of the labeled parts is used for feeling A. 1 B. 2 C. 3 D. 4

14. The structure labeled 2 is the A. compound eye B. Ocellus C. antenna D. labial palp

15. In a dicotyledonous stem, each companion cell is found beside the A. endodermal cell B. xylem vessel C. sieve tube D. Pericyclic fibre

Use the figure below to answer questions 16 and 17



16. Which of the structure is the molar A. 1 B. 2 C. 3 D. 4.

17. What is the function of the 3? A. Cutting off large pieces of food B. Seizure and tearing of prey C. Grinding of food D. Tearing of the flesh only.

18. If a healthy potted plant is continuously kept in dim light A. The rate of respiration may equal that of photosynthesis B. More carbon dioxide water are taken in C. Respiration may be halted D. The volume of oxygen released increases.

19. The pancreatic juice contains the enzymes amylopsin A. pepsin and trypsinogen B. rennin and steapsin C. steapsin and trypsinogen D. steapsin and ptyalin.

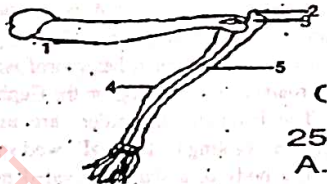
20. Aged erythrocytes are destroyed in the A. pancreas B. Liver C. lymph node D. Kidney.

21. The seedling in a rice field were found to have thin lanky growth with reddish leaves and poor root development. This is because the soil lacks A. Sulphur B. Phosphorus C. potassium D. Iron.

22. There will be agglutination when the A. Group A serum mixes with group B erythrocytes B. Group A serum mixes with group B erythrocytes C. Group AB serum mixes with group O erythrocytes D. Group B serum mixes with group B erythrocytes.

23. Which of the following is the function of lymph? A. Carries hormones round the body B. Transports nutrients and oxygen from blood capillaries to the cells C. Distributes heat uniformly round the body D. Conveys amino acids and glucose from the small intestine to the liver.

Use the figure below to answer questions 24 to 26



24. The type of joint at the point labeled 3 is the A. pivot joint B. gliding joint C. ball and socket joint D. hinge joint.

25. Which of the labeled bones is the ulna? A. 1 B. 3 C. 4 D. 5.

26. What is the name of the structure labeled 2? A. Odontoid process B. Olecranon process C. Patella D. Condyle.

27. The lumbar vertebrae when compared with thoracic vertebrae has A. longer neural spine B. wider neural canal C. thicker centrum D. shorter transverse process.

28. Wind-pollinated flowers usually have A. Rough pollen grains B. Sticky stigmas C. Small and short stigmas D. Long styles.

29. The components of castor oil seed and the maize grain are similar except for the A. number of cotyledons B. location of the embryo C. Number of radicles D. number of plumules.

30. A corm differs from a bulb in that A. Its stem is the main food storage organ B. it has a flattened disc-shaped stem C. buds are absent in the axils of the leaves D. adventitious roots are present.

31. Exponential increase in the population of an organism is a characteristic feature of A. binary fission B. sexual reproduction C. budding D. vegetative propagation.

32. The irreversible life process by which new protoplasm is added to increase the size and weight of an organism can be termed A. anabolism B. Catabolism C. growth D. development.

33. Fruit enlargement can be induced by spraying young ovary with? A. cytokinin, abscisic acid and ethylene B. gibberellin, ethylene and abscisic acid C. auxin, abscisic acid and ethylene D. auxin, cytokinin and gibberellin.

34. A fundamental similarity between nervous and hormonal systems is that both? A. involve chemical transmission B. have widespread effects C. shed chemicals into the blood stream D. evoke rapid responses.

35. The region that controls most of the unconscious processes of a mammalian body is the A. cerebellum B. Cerebrum C. spinal cord D. medulla oblongata.

36. During cell division, the two strands of chromosomes are joined at a point called A. spindle B. Chromatid C. centromeres D. aster.

37. When the two alleles present in an organism are of the same type the genotype is described as A. heterozygous B. heterogamous C. homozygous D. homologous.

38. If parent with blood groups AB and OO produce six children A. three of them will have

group B B. two of them will have group A C. all the offspring will have group O D. none of them will have group A.

39. Which of the following is a six-linked character? A. sickle-cell anaemia B. tongue rolling C. skin colour D. colour blindness

40. In an ecosystem, the LEAST efficient energy transfer link is from A. producers to primary consumer B. sun to producers C. primary consumers to secondary consumers D. secondary consumers to decomposers

41. Lichen is an example of? A. a Saprophytic organism B. a symbiotic association C. an epiphytic plant D. a carnivorous plant

42. A physiological adaptation of plants to the problem of excessive water loss is the? A. reduction in the number of stomata B. reversal of the normal stomatal rhythm C. possession of shallow roots D. possession of waxy cuticle.

43. Which of the ways of controlling bilharzia can result in pollution? A. Clearing water weeds on which the snails feed B. Treating infected people with drugs C. Preventing contamination of water by infected urine and faeces D. Applying chemical to kill the snails.

44. Which of the following diseases can be caused by a bacterium? A. Ringworm B. Poliomyelitis C. Malaria D. Syphilis.

45. Which of the following is a dangerous product of coal burning? A. Sulphur dioxide B. Carbon dioxide C. Carbon D. Nitrogen.

46. 5 g of oven dried soil was heated in a furnace for 24 hours. After cooling, it weighed 4.8 g. What is the amount of humus in the soil? A. 40.0 g per 100 g dry soil B. 4.4 g per 100 g dry soil C. 4.0 g per 100 g dry soil D. 0.4 g per 100 g dry soil.

47. Most irrigated lands often become unproductive in later years because of A. loss of fertility B. increase in salinity C. soil erosion D. loss of water.

48. Farmers practise crop rotation because it A. helps to prevent soil erosion B. allows two crops to be planted at the same time C. helps to conserve soil fertility D. is an alternative to shifting cultivation.

Use the figure below to answer question 49 and 50



49. In which of the habitats will the plants show xeromorphic features most prominently? A. X B. R C. P D. Q.

50. Which ecological factor exerts the greatest influence on the structure of the profiles? A. Topographic B. Edaphic C. Biotic D. Climatic.

1989 U.M.E BIOLOGY SOLUTION

1. B - The structure labeled '5' is the Golgi body or Golgi apparatus. The Golgi apparatus aids the synthesis, packaging and distribution of materials within the cell.

2. C - Ribonucleic acid is found in the nucleus.

3. C - The structure labeled '4' is the mitochondrion. It is the site of energy production and as such, it is referred to as the power house of the cell.

4. D - Virus occurs at the borderline between living and non-living things. When a virus is placed in a living cell, it becomes living; when placed in a non-living medium, it takes a non-living crystalline form.

5. B - Coelenterates (such as hydra) possess a gut with a single opening. The opening is used as both mouth and anus.

6. B - A multinucleate body without internal cell boundaries is characteristic of fungi.

7. A - Double fertilization is a unique feature of angiosperms. The first fertilization produces the embryo while the second produces the endosperm.

8. C - Internal and external segmentation is a feature of the organisms in phylum Annelida. This explains why annelids are often referred to as segmented worms.

9. A - Say "PAWO"! This means: Plant Absorbs Water by Osmosis.

10. B - Crustaceans possess two pairs of antennae, five pairs of jointed legs and two body divisions (the abdomen and the cephalothorax).

11. A - Pedipalps refer to the second pair of appendages of the prosoma in the sub-phylum chelicerata. Pedipalps in spiders are variously developed for grasping, sensing etc.

12. D - The body of a snail is divided into foot, head and a coiled mass situated in the shell. This coiled mass is known as the visceral mass.

13. A - The part labeled '1' is the antenna. The antenna is used for feeling.

14. D - The structure labeled '2' is the labial palp.

15. C - In a dicotyledonous stem, each companion cell is found beside the sieve tube.

16. A - '1' - molar; '2' - premolar; '3' - canine and '4' - incisors.

17. B - The tooth labeled '3' is the canine which is used for gripping and tearing.

18. A - Normally, the rate at which materials are synthesized (anabolism e.g. photosynthesis) is expected to be greater than the rate at which materials are broken down (catabolism e.g. respiration). Now, a plant kept in dim light will have its photosynthetic ability reduced. It can be so reduced that the rate of photosynthesis then equals that of respiration.

19. C - The pancreatic juice contains enzymes such as lipase, amylase, trypsin, steapsin etc.

20. B - Aged erythrocytes are destroyed in the liver.

21. B - Poor root development, blue or reddish colouration of leaves and poor growth are symptoms of phosphorous deficiency.

22. B - Agglutination occurs when blood samples containing contrasting antigens and antibodies are mixed. If blood type A is mixed with B, the antigen A present in blood A will react with the antibody A present in blood type B.

23. B - Apart from its protective role, the lymph also serves as a connection between blood capillaries and cells.

24. B - The type of joint at the point labeled '5' is the gliding joint. A gliding joint is formed when two flat bones meet.

25. D - The bone labeled '4' (radius) and the one labeled '5' (ulna) constitute the bones of the forearm. In fact, without having to use the diagram as a reference, the ulna is always the longer of the two bones.

26. B - The part labeled '2' is the olecranon process.

27. C - The centrum of the lumbar vertebra is thicker than that of thoracic vertebra.

28. D - The follow are the characteristics of wind pollinated flowers:

- Stigmas are borne on long flexible styles
- Scent is usually absent
- Nectar is usually absent
- Pollen grains are small, light, smooth, dry and numerous
- Anthers are large and produce large quantities of pollen grains.
- Flowers are often unisexual.
- Flowers are small and inconspicuous

29. A - Maize is monocotyledonous while castor is dicotyledonous. Thus, maize, grain has one seed leaf (cotyledon) while castor oil seed has two seed leaves (two cotyledons).

30. A - A corm is basically a stem that has been modified into a mass of storage tissue.

31. A - During binary fission, one organism divides into two, two into four, four into eight etc. This portrays an exponential rate of growth.

32. C - The irreversible life process by which new protoplasm is added to increase the size and weight of an organism is referred to as growth.

33. D - Auxin, cytokinin and gibberelin can induce fruit enlargement.

34. A - Both nervous and hormonal systems involve chemical transmission. Yes! Nervous system also employs chemical. The transmission of impulse along the synaptic gap is through a neurochemical e.g. acetylcholine.

35. D - Majority of the unconscious processes of a mammalian body are controlled by the medulla oblongata.

36. C - The two chromatids, making up a typical chromosome, are joined at a region known as the centromere.

37. C - When the two alleles present in an organism are of the same type, the genotype is said to be homozygous.



AO = A
BO = B
OO = O

Since two out of the four children have blood group B, it can be said that three out of six children will take to B.

39. D - Haemophilia, baldness and colour blindness are the common sex-linked characters.

40. D - As we move across the various trophic level (from the producer), the amount of useful energy available decreases markedly. Producer → Primary consumer → Secondary consumer → Tertiary consumer → decomposer. In terms of energy transfer across each link, $1 > 2 > 3 > 4$.

41. B - Lichen is a mutualistic association between algae and fungi.

42. B - Reduction in the number of stomata and possession of waxy cuticle are good adaptations for water conservation. However, these are morphological adaptation, not physiological. Reversal of the normal stomatal rhythm is a physiological adaptation for water conservation

43. D - The application of chemicals to kill the snails can result in pollution. Chemicals used for killing snails are called molluscicides.

44. D - Syphilis is caused by a bacterium known as *Treponema pallidum*.

45. A - Sulphur dioxide (SO₂) is a dangerous product of coal burning.

46. C - Mass of dried soil = 5g
Mass of the soil after been heated = 4.8g
Mass of humus burnt away = 5g - 4.8g = 0.2g
It must not be forgotten that this 0.2g is from 5g of soil. Thus, mass of humus in 100g of soil = $\frac{0.2g}{5g} \times 100g = 4g$

47. A - Prolonged irrigation may cause a loss of fertility of a soil sample.

48. C - Farmers practice crop rotation because it helps to conserve soil fertility. It improves soil structure as well, through the alternation of deep-rooted and shallow-rooted plants.

49. A - Plants in desert areas have xeromorphic adaptations for water conservation. The small leaves of plants in region X is a worthwhile xeromorphic feature.

50. D - Climatic factors exert the greatest influence on the structures of a vegetation.

BIOLOGY U.M.E. 1988

1. The function of ribosomes in cells is A. protein synthesis B. starch synthesis C. transport of materials D. lipid storage

2. Which of the following structures is common to Euglena, white blood cell and Amoeba? A. Vacuole B. Cell wall C. Cilia D. Cell membrane

3. The term Thallophyta refers to A. ferns and mosses B. algae and fungi C. mooses and liverworts D. fungi and ferns

4. The following organisms are hermaphrodites EXCEPT A. snail B. Taenia C. schistosoma D. Earthworm

5. Parasitic forms are NOT found among A. platyhelminthes B. Nematodes C. molluscs D. Annelids

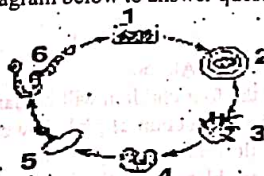
6. Which of the following sets of organisms represents the correct trend from simple to complex structural organization? 1. Motlusca 2. Platyhelminthes 3. Nemo 4. Protozoa A. 4 → 1 → 2 → 3 B. 4 → 3 → 2 → 1 C. 4 → 2 → 1 → 3 D. 4 → 2 → 3 → 1

7. Spirogyra, Euglena and Chlamydomonas share many characteristics EXCEPT A. nutrition B. Reproduction C. mobility D. Irritability

8. The prothallus of a fern is equivalent to the gametophyte generation of a moss because it A. is inconspicuous B. has rhizoids C. bears sexual organs D. is multicellular

9. What is the function of trichocyst in Paramecium? A. Movement B. Defence C. Excretion D. Reproduction

Use the diagram below to answer questions 10 and 11



10. At which stage in this cycle can man be infected? A. 2 B. 4 C. 5 D. 6

11. Which stage is found in the muscle of an infected pig? A. 3 B. 4 C. 5 D. 6

12. The long and coiled intestine of a young tadpole is an adaption to its A. herbivorous diet B. carnivorous diet C. aquatic habitat D. insectivorous habitat

13. Lung books are used for respiration in A. Spiders B. Insects C. millipedes D. snails

14. Insects and millipedes have many features in common EXCEPT A. Exoskeleton B. Jointed appendages C. Compound eyes D. Segmented body

15. The major function of the swim-bladder in fishes is A. breathing B. Buoyancy C. swimming D. Diving

16. Which of the following statements gives the BEST description of bark? A. Tissues outside the vascular cambium B. Cork-like tissues found only in stems C. Brown tissues never found in primary growth D. Cork-like tissue of old trees

17. In the transverse section of the leaf of maize vascular bundles A. a row B. one circle C. alternate positions D. two circles

18. If an animal has diastema, it would NOT possess A. incisors B. canines C. premolars D. Molars

19. If the gall bladder of a mammal is damaged, which of the following will be most seriously affected? A. Glycolysis B. Digestion of starch C. Digestion of fats and oils D. Digestion of proteins

20. Which of the following will be first digested if ingested at the same time? A. Cooked beans B. Cooked rice C. Cod liver oil D. Roasted beef

21. If the phloem of a healthy plant is killed by heat treatment, the A. Upward movement of salts will cease B. Food manufacture in the leaves will accumulate C. Whole plant will die immediately D. Leaves of the plant will become yellow

22. In the mammalian respiratory system, exchange of gases occurs in the A. lungs B. Bronchi C. bronchioles D. Alveoli

23. The main waste products formed in plants are A. alkaloids, tannins and resins B. water, alkaloids and carbon dioxide C. oxygen carbon dioxide and alkaloids D. water, carbon dioxide and oxygen -

24. In the kidney, the malpighian corpuscle is located in the A. medulla B. Hilium D. Cortex D. pelvis

25. The skin, through the sweat glands, functions as A. an excretory organ B. a respiratory organ C. a sensory organ D. a protective organ

26. Parenchyma cells serve as supporting tissue when they A. contain chloroplasts B. have crystals C. become flaccid D. become turgid

27. Taxism differs from tropism because A. the whole organism is affected B. it is a directional movement C. it is a response to multi-directional stimuli D. part of the organism is affected

28. Adry dehiscent fruit which breaks up into one-seeded part is a A. schizocarp B. Capsule C. follicle D. Legume

29. Airspaces are characteristic of seeds or fruits dispersed by A. birds B. water C. wind D. explosive mechanism

30. In vegetative propagation, which of the following requires part of another plant to develop A. Scion B. Bulb C. Rhizome D. Sucker

31. Which of these plant groups are normally propagated by asexual means? A. Banana, yam, pineapple and cassava B. Yam, cassava, rubber and banana C. Yam, cassava, orange and banana D. Banana, cashew, coffee and pineapple

32. In mammals, the placenta perform functions similar to these of the A. lungs, kidneys and digestive system B. lungs, heart and nervous system C. liver, intestines and reproductive system D. intestines, heart and digestive system.

33. The radicle of a bean seedling grows most rapidly in the region A. O' the root tip B. Just above the root tip C. Just around the root tip D. Just below the root tip

34. The main function of the choroid is A. protection of the eye ball B. transmission of light

C. supply of nutrients to tissues of the eye
D. converging light

35. What part of the central nervous system is concerned with answering an examination question?
A. Cerebrum B. Cerebellum
C. Medulla oblongata D. Spinal cord

36. If a dark-skinned woman (Bb) marries an albino man (bb) and they have four children, how many of the children will be dark-skinned?
A. 3 B. 2 C. 1 D. C

37. A red-coloured flower when crossed with a white-coloured one produced pink flowers. This is an example of
A. Complete dominance B. Blending inheritance
C. Interaction of genes D. back crossing

38. The turbidity of a pond can be measured using the
A. anaemometer B. secchidisc
C. theodolite D. Hydrometer

39. The most important substances necessary for the maintenance of life are carbon, oxygen, hydrogen, soil and enzymes
A. hydrogen, soil and enzymes B. hydrogen, salt and water
C. nitrogen, salt and soil D. nitrogen, salt and water

40. If an organism obtains its food by means of haustoria, it is said to be
A. holophytic B. Heterophytic
C. saprophytic D. Parasitic

41. Which of the following relationships involves only one organism?
A. Saprophytism B. Commensalism
C. Parasitism D. Symbiosis

42. Which of the following has the greatest influence on the distribution of animals on the distribution of animals in marine and fresh water habitats
A. pH B. Salinity C. Water current D. Turbidity

43. Which of these groups of animals is likely to be found in freshwater?
A. Bloodworm, pond skater and scorpion
B. Blood worm, pond skater and dragonfly larva
C. Pond skater, scorpion and dragonfly larva
D. Pond skater, blood worm and ant-lion.

44. One of the characteristics of plants in the savanna is the
A. possession of thin, smooth barks
B. possession of large tap roots
C. production of seedlings on mother plants
D. possession of thick flaky barks.

45. Which of the following diseases can be contracted in areas with fast flowing rivers?
A. Schistosomiasis B. Elephantiasis
C. Syphilis D. Onchocerciasis.

parts of the concerned organisms move.

28. A - A schizocarp is a dry dehiscent fruit which has several seeds and breaks up into units, each enclosing a seed.

29. B - Airspaces are characteristics of seeds or fruits dispersed by water. Plants like coconut have mesocarp which traps air, enabling the fruit to stay afloat in water.

30. A - A section of plant which is attached to another plant of desirable characteristics for the purpose of vegetative propagation is known as a scion.

31. A - Banana, yam, pineapple, and cassava are normally propagated by asexual means. Sucker is used for banana and pineapple; tuber for yam and stem cutting for cassava.

32. A - The placenta perform functions similar to those of the lungs, kidneys and the digestive system for the foetus.

33. B - The radical of a bean seedling grows most rapidly in the region just above the root tip.

34. C - The choroid (which is the middle layer of the eye) performs the major role of supplying nutrients to tissues of the eye

35. A - The cerebrum controls consciousness, judgement, reasoning and intelligence.

46. Which of the following causes pollution?
A. Consumption of canned drinks
B. The addition of fertilizer to farmland
C. Respiration of living organism
D. Burning of refuse

47. The mineral nutrient that is most bound to the soil is?
A. phosphorus B. calcium
C. iron D. potassium.

48. The mineral nutrient that easily gets leached out of the soil is?
A. Phosphorus B. Calcium
C. Magnesium D. Nitrate

49. Most commercial fertilizers are rich in salts of
A. Sodium, iron and calcium
B. Nitrogen, phosphorus and potassium
C. iron, copper and nitrogen
D. Calcium, sodium and phosphorus.

50. Dead plants and animals are decomposed by bacteria and fungi into
A. Nitrates B. Nitrites
C. Amino acids D. Nitrate

1988 U.M.E BIOLOGY SOLUTION

1. A - The function of ribosomes in cells is protein synthesis.

2. B - The cell membrane is one of the structures common to Euglena, white blood cell and Amoeba.

3. B - Algae and fungi are collectively referred to as thallophytes

4. C - Snails, tapeworms (Taenia) and earthworms are hermaphrodites. Schistosoma species are not hermaphroditic.

5. C - Platyhelminthes are parasitic, some annelids (e.g. leeches) are parasitic; nematodes are also parasitic.

6. D - The correct evolutionary trend among invertebrates is: Protozoa → Coelenterata → Platyhelminthes → Nematoda → Annelida → Mollusca → Arthropoda → Echinodermata

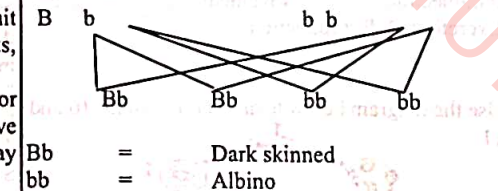
7. C - Chlamydomonas and Euglena have flagella for movement while Spirogyra does not.

8. C - Gametophytes bear sexual organs. Prothallus is the name given to the gametophyte of a fern.

9. B - Paramecium has small, bottle-shaped structure called trichocysts. Trichocysts are used for defence.

10. B - At stage '4', the bladder-worm is in the muscles of the pig. A person that consumes the contaminated pork gets infected.

36. B -



Thus, two of the four children will be dark-skinned

37. B - The production of pink flower from red and white flowers is known as incomplete dominance or blending inheritance. Generally speaking, cases in which one allele is not completely dominant over the other are referred to as incomplete dominance or blending inheritance.

38. B - The turbidity of a body of water can be measured using the secchi disc.

39. B - The most important substances necessary for the maintenance of life are carbon, hydrogen, oxygen, salt and water.

40. D - Haustorium is the structure used by parasitic plant or fungi to draw nutrients from the tissues of the host.

41. A - In saprophytism, an organism feeds on dead and decaying organic substances. Thus, it can

11. B - Stage '4' occurs in the muscle of an infected pig.

12. A - The young tadpole feeds on microscopic algae (i.e. it is herbivorous). Thus, the long and coiled intestine of a young tadpole is an adaptation to its herbivorous diet.

13. A - Lung books are respiratory devices found in arachnids e.g. spider.

14. C - Insects have compound eyes while millipedes have simple eyes.

15. B - The swim bladder in fishes is used for the maintenance of buoyancy in water.

16. A - Bark is the outermost layers of stems and roots of woody plants. It encompasses all tissues outside the vascular cambium.

17. B - The vascular bundles of monocots are arranged in a circle. Maize is a monocotyledonous plant.

18. B - Herbivores do not have canines. The space created between incisors and premolars due to the absence of canine is known as diastema.

19. C - Bile, which aids in the emulsification of fats, is stored in the gall bladder. Thus, if the gall bladder of a mammal is damaged or removed, the digestion of fats and oils will be seriously affected.

20. B - The digestion of starch begins right in the mouth. This is because the enzyme ptyalin, present in saliva, aids in partial hydrolysis of starch to maltose.

21. B - Since phloem is responsible for the transport of manufactured food from the leaves, killing the phloem will cause the food manufactured in the leaves to accumulate.

22. D - In the mammalian respiratory system, exchange of gases occurs in the alveoli.

23. A - The main excretory products of plants are alkaloids, tannins and resins.

24. C - In the kidney, the malpighian corpuscle is located in the cortex.

25. A - Sweat, produced by the sweat glands, removed from the skin, is a mixture of excretory products. Thus, the skin is regarded as an excretory organ.

26. D - When parenchyma cells are turgid, they provide firmness and turgidity to the stem.

27. A - In taxis, the whole organism moves. In tropism and nastism, only

be said that saprophytism involves only one organism.

42. A - pH exerts the greatest influence on the distribution of animals in marine and fresh water habitats. Salinity only affects marine organisms.

43. B - Fresh water animals include protozoans, blood worm, pond skater, dragonfly larva, water boatman etc.

44. D - Some savanna plants have thick barks which reduce the rate of transpiration and protect them from bush fires.

45. D - Onchocerciasis, also known as water blindness, can be contracted in areas with fast flowing rivers.

46. D - Open burning of refuse is a good source of air pollution.

47. C - The mineral nutrient that is most bound to the soil is iron. Iron can be so bound to the soil that nothing is released for plant uptake.

48. D - Excess nitrate ions which are not absorbed move downward and get leached into underground water bodies.

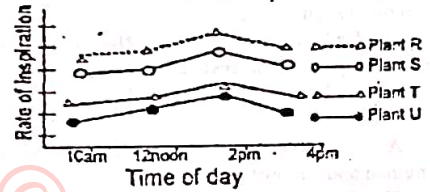
49. B - Nitrogen, phosphorous and potassium are the main macronutrients which are present in large amount in majority of fertilizers.

50. D - The nitrogen contents of dead plants and animals are converted into ammonium compounds or ammonia as they are acted upon by bacteria and fungi.

BIOLOGY U.M.E. 1987

- The function of endoplasmic reticulum is A. protein synthesis B. intracellular transport of materials C. digestion and destruction of foreign bodies D. production of energy from glucose
- Which of the following features of Euglena is animals? A. Paramylum granules B. Flagellum C. Pellicle D. Pyrenoid
- An organism found on a bare rock surface has features of algae and fungi. The organism is A. an epiphyte B. alichen C. abryophyte D. afem.
- In a plant exhibiting alternation of generations, the diploid multicellular stage is known as A. gametophyte B. spermatophyte C. holophyte D. sporophyte
- A characteristic that distinguishes bryophytes from flowering plants is the A. Possession of true stems and leaves B. Ability to reproduce asexually C. Absence of vascular tissues D. Ability to grow in moist habitats.
- A good example of a diploblastic organism is A. Amoeba B. Hydra C. earthworm D. Roundworm
- The function of the clitellum in the earthworm is to A. aid digestion B. prevent desiccation C. assist locomotion D. secrete cocoon.
- The crayfish is an arthropod because A. its body consists of cephalothorax and an abdomen B. it has a pair each of antennae and antennules C. every segment of its body carries a pair of appendages D. its body is covered with an exoskeleton made of chitin.
- The hypha of Rhizopus is said to be coenocytic because it A. does not contain chlorophyll B. has no cross wall C. is vacuolated D. stores oil globule
- The most true fern spores are grouped into A. Indusium B. Fronds C. Prothalli D. Sori
- In the reproduction of most water is essential because A. they live in moist habitat B. they cannot reproduce without water C. the male gametes must swim to fertilize the ovum D. they produce spores
- In tapeworm, the two structures that run throughout the length of the body are the A. nerve cord and the excretory duct B. sperm duct and the nerve cord C. genital pore and the excretory duct D. the sperm duct and the genital pore
- Which of the following is NOT a characteristic of snail? A. Bilateral symmetry B. Chitinous exoskeleton C. Muscular foot. D. Soft unsegmented body in a mantle
- In the life history of a butterfly, destruction of crop is caused by the A. maggot B. Nymph C. caterpillar D. Pupa.
- The correct sequence of tissues in the anatomy of a young dicotyledonous stem from the inside to the outside is A. pith, phloem, cambium, xylem, parenchyma, collenchyma and epidermis B. xylem, parenchyma, collenchyma, cortex, endodermis, phloem, cambium, cortex, endodermis, collenchyma and epidermis C. pith, xylem, collenchyma and epidermis D. cambium, phloem, collenchyma, parenchyma and epidermis .D. phloem, xylem, cambium, cortex, endodermis, collenchyma and epidermis.
- Secondary thickening is initiated in a dicotyledonous stem by the A. xylem parenchyma B. secondary phloem C. endodermis D. cambium
- In demonstrating the importance of mineral elements in plants, the culture bottle must be darkened to A. prevent algal growth in culture

- Allow root growth C. prevent breakdown of mineral elements D. prevent photosynthesis in the root.
- The vitamin which is important in the formation of the retina pigment is A. vitamin A B. vitamin B C. Vitamin C D. vitamin D
- Which of the following lists of organs is directly involved in nutrition A. Oesophagus, bronchus, stomach, pancreas and anus B. Spleen, pharynx, duodenum, Jejunum and rectum C. Teeth, oesophagus, ileum, lungs and large intestine D. Salivary gland, liver, stomach, villi and colon.
- In the standard experiment to show that oxygen is given off during photosynthesis, sodium bicarbonate is used to A. neutralize the acid in water B. supply mineral salt to water plant C. supply carbon dioxide for photosynthesis D. kill micro-organism in water
- One cubic centimeter of lymph is richer than an equal volume of blood in A. erythrocytes B. Leucocytes C. amino acid D. Glucose
- The oxidative part of the respiratory process takes place in the A. mitochondria B. ribosomes C. endoplasmic reticulum D. golgi bodies
- Fatigue of leg muscles may occur after riding many kilometers on a bicycle because of A. insufficient glucose B. excess carbon dioxide C. excess protein D. insufficient oxygen
- The function of the loop of Henle is to



- increase the flow of urine B. concentrate amino acids in the kidney tissue C. concentrate sodium chloride in the medulla of the kidney D. increase the volume of urina
- Use the information in the graph below to answer questions 25 and 26



- Which of the plants is likely to have broad leaves with thin cuticle? A. R B. S C. T D. U
- Which of the plants is likely to be desert species? A. U B. T C. S D. R V
- Sclerenchyma cells are lignified to A. strengthen and support the plant B. transport synthesized food C. conduct water and salt D. protect the plant from injury
- The pineapple fruit is best described as A. aggregate, succulent and indehiscent B. aggregate, succulent and dehiscent C. multiple, succulent and indehiscent D. multiple, succulent and dehiscent
- The flower shown above is A. Complete regular, hermaphroditic with superior ovary B. Incomplete, regular, staminate with inferior ovary C. Complete, regular, hermaphroditic with inferior ovary D. Incomplete, irregular, pistillate with superior ovary
- A flower showing radial symmetry is said to be A. pentamerous B. Protandrous C. protogynous D. Actinomorphic

- Asamara differs from a cryselaby having A. an extended pericarp B. a hard pericarp C. a pericarp fused with the seed coat D. some hairy outgrowths on the pericarp
- The plantain reproduces asexually by A. suckers B. Buds C. fragments D. Spores
- Growth can best be determined in a population of Spirogyra by measuring the A. total lengths of the filaments B. total widths of the filaments C. rate of photosynthesis in the population D. dry weight of the organism.
- Most cells in higher animals retain their power of division EXCEPT A. lymphocytes B. nerve cells C. malpighian cells D. germ cells
- A severe deficiency of thyroxin results in A. diabetes mellitus B. sexual underdevelopment C. cretinism D. Gigantism
- The growth of a coleoptile towards unilateral light source is due to A. rapid rate of photosynthesis B. unequal distribution of auxin C. the effect of geotropism D. the effect of photolysis
- The sequence of ear ossicles from the fenestra ovalis is A. malleus, incus and stapes B. malleus, stapes and incus C. stapes, incus and malleus D. stapes, malleus and incus
- The centre for controlling body temperature in the brain is the A. cerebrum B. Cerebellum C. medulla D. Hypothalamus
- Unlike auxins, gibberellins A. induce the formation of adventitious roots B. do not affect leaf and fruit abscission C. cannot stimulate stem elongation D. are quite effective as herbicides.
- A gene which expresses itself only in the homozygous condition is A. a mutant B. Dominant C. recessive D. Lethal
- An example of monohybrid inheritance in man is A. astigmatism B. cretinism C. hyperthyroidism D. Albinism
- If a plant, homozygous for round and yellow (RR;YY), is crossed with a wrinkled green type (rr;yy) all of the resulting seeds will be A. blue and wrinkled B. round and yellow C. wrinkled and yellow D. round and greenish-yellow
- The ratio of carriers to sicklers in the F₂ generation derived from a parental cross of two carriers of haemoglobin S gene is A. 3:1 B. 1:3 C. 2:1 D. 1:2
- In which of the following crosses will all the female offspring be colour blind? A. Colour blind mother x colour blind father B. Colour blind mother x normal father C. Carrier mother x colour blind father D. Carrier mother x normal father
- Which of the following relates to edaphic factors? A. The structure of the earth's surface B. The influence of living organism on each other C. Temperature, rainfall and humidity D. The influence of soils on plants and animals
- Epiphytes growing on the branches of trees provide an example of the relationship known as A. parasitism B. Commensalism C. saprophytism D. Holophytism
- Poliomyelitis is an infectious disease caused by A. virus B. Protozoan C. bacterium D. Fungus
- One of the functions of UNICEF is to A. prevent and control major diseases B. prevent disease outbreak by administering vaccines C. improve the health and nutrition of children and nursing mother D. monitor environmental pollution
- Nitrifying bacteria are important because they A. release nitrogen to the atmosphere B. convert atmospheric nitrogen to ammonia C. combine ammonia with nitrogen D. oxidize ammonium salts to nitrites

50. The process by which lime is added to clay soils is known as A. sedimentation B. Flocculation C. leaching D. Manuring

1987 U.M.E BIOLOGY SOLUTION

1. B - The major function of the endoplasmic reticulum is to transport materials within the cell. The endoplasmic reticulum also provides a surface area for chemical reactions to occur.

2. C - The possession of pellicle is an explicit animal feature of Euglena.

3. B - A lichen is the combination of algae and fungi. The two organisms benefit mutually from each other.

4. D - The sporophyte is diploid while the gametophyte is haploid.

5. C - Schizophytes, bryophytes and thallophytes lack vascular tissues while pteridophytes and spermatophytes have well developed vascular tissues. Flowering plants are spermatophytes.

6. B - An organism that has two body layers is said to be diploblastic while the one that has three is said to be triploblastic. Earthworm and roundworm are triploblastic while hydra is diploblastic.

7. D - The function of the clitellum in the earthworm is to secrete cocoon. The cocoon is a membranous structure where eggs are kept.

8. D - Possession of chitinous exoskeleton is a general feature of arthropods. Recall that arthropods are divided into: (i) Crustaceans e.g. crab (ii) Insects e.g. cockroach (iii) Arachnids e.g. spider (iv) Myriapod e.g. millipede.

9. B - The hypha of Rhizopus is said to be coenocytic because it has no cross wall

10. D - Spores of ferns are present in sporangia which are round on the underside of mature leaves (fronds). Each group of sporangia is called sorus (the plural is sori).

11. C - Bryophytes (e.g. moss) reproduce by both sexual and asexual means. The asexual reproduction is by spore formation while the sexual reproduction is by fusion of gametes. Water is essential in the sexual reproduction as the male gametes must swim to fertilize the ovum.

12. A - Tapeworms are adapted for the parasitic life. Their long, ribbon-like bodies may grow up to 12m. The excretory and nervous system extends the length of the body. Tapeworms lack sense organs, mouths and digestive tract (since they absorb digested food materials).

13. B - Possession of chitinous exoskeleton is a characteristics of arthropods not that of snails: You may wish to state that snails have calcareous exoskeleton.

14. C - The destructive stage of insects is the larva stage. The larva form of the butterfly is known as the caterpillar.

15. C - The correct sequence of the tissues of a dicot stem (from inside to the outside) is: Pith → Xylem → Cambium → Phloem → Collenchyma → Parenchyma → Epidermis

16. D - Secondary thickening is initiated in a dicot stem by the cambium.

17. C - In demonstrating the importance of mineral elements in plants, the culture bottle must be darkened to prevent breakdown of mineral elements.

18. A - Vitamin A is very important in the formation of the retina pigment. The deficiency of vitamin A causes night blindness.

19. D - Salivary gland, liver, stomach, villi and colon are directly involved in nutrition as:

(i) Salivary gland secretes saliva which aids digestion in many ways.

(ii) Liver secretes bile which helps in emulsifying fats.

(iii) Stomach contains gastric juice which has pepsin, rennin and HCl, each playing vital roles in digestion

(iv) Villi aids the absorption of digested food.

(v) Colon absorbs water from the material about to be egested.

20. C - It is generally known that the two most important raw materials for photosynthesis are water and carbondioxide. Sodium bicarbonate is a good source of carbondioxide. $2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$

21. B - Lymph, though totally lacking in erythrocytes, is richer than blood in leucocytes.

22. A - The oxidative part of the respiratory process takes place in the mitochondria. The mitochondria is the power house of the cell.

23. D - When there is an insufficient supply of oxygen, the anaerobic respiration occurs - using glucose to produce lactic acid (or ethanol in plants). The fatigue is due to the accumulation of the lactic acid in the muscles.

24. C - The urine becomes concentrated as it passes down the loop of Hence.

25. A - A plant that has thin cuticle and broad leaves will have a high rate of transpiration. Since plant 'R' has the highest transpiration rate, it can be said to possess those features.

26. A - Reduced rate of transpiration (using the various adaptive features) is characteristics of desert plants. Thus, plant 'U' is likely to be a desert species.

27. A - Sclerenchyma cells are lignified to strengthen and support the plant.

28. C - Pineapple is a multiple, succulent and indehiscent fruit.

29. C - Since the flower has all the four whorls (calyx, corolla, androecium and gynoecium), it is a complete flower. Since the flower can be cut into identical halves along several planes it is a regular flower. Since both male and female parts are present, it is hermaphroditic. Since the ovary is situated below other floral parts, it is said to be inferior.

30. D - A flower that shows radial symmetry is used to be actinomorphic while the one that shows bilateral symmetry is said to be zygomorphic. Hibiscus is a good example of actinomorphic flowers; Delonix, Crotalaria and Pride of Barbados are zygomorphic.

31. A - Samara is a simple fruit with the pericarp extended to form one or more wing-like structures. A good example of combretum.

32. A - Plantain reproduces asexually by suckers.

33. A - The dry weight is the most reliable parameter to measure growth. However, the organisms gets killed if one is to obtain the dry weight. In a population of Spirogyra, growth can be determined by measuring the total lengths of the filaments.

34. B - At a point, nerve cells lose their power of division.

35. C - Thyroxin is mainly concerned with the regulation of growth and development of body cells. The deficiency causes cretinism and myxoedema.

36. B - The growth of a coleoptiles towards unilateral light source is due to unequal distribution of auxin.

37. C - From the ear drum to the oval window (fenestra ovalis), the sequence is: malleus → incus → stapes. Then, from the oval window to the cardrum the sequence is: stapes → incus → malleus.

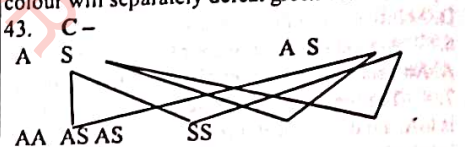
38. D - The centre for controlling body temperature in the brain is the hypothalamus.

39. B - Auxins affect leaf and fruit abscission while gibberellins do not. When the concentration of auxins falls and more abscisic acid is formed, an abscission layer is formed at the base of the leaf stalk.

40. C - A recessive gene is always masked in the heterozygous condition. A gene that is expressed in the heterozygous condition is said to be dominant. A recessive gene is only expressed in the homozygous condition.

41. D - An example of monohybrid inheritance in man is albinism.

42. B - Since 'round and yellow' is implied in the capital form, it is dominant over 'wrinkled and green'. This does not in anyway mean that the colour and shape of seeds are inherited together; round shape will defeat wrinkled shape and yellow colour will separately defeat green colour.



AA = Normal; AS = Carrier; SS = Sickler
Since there are two carriers (AS) and one sickler (SS), the ratio is 2 : 1.

44. A - All the children, not only daughters, will be colour blind if both parents are colour blind.

45. D - Edaphic factors are strictly concerned with soil.

46. B - Epiphytes are not parasites. Their stay does not affect the host plant in any way. Thus, the association is commensalistic.

47. A - Poliomyelitis is an infectious disease caused by virus

48. C - One of the functions of UNICEF is to improve the health and nutrition of children and nursing mother.

49. D - Get it right! Trapping of atmospheric nitrogen for plants' use is the role of nitrogen fixing bacteria (like Rhizobium). The oxidation of ammonium salt to nitrite and eventually to nitrate is the function of nitrifying bacteria (Nitrosomonas & Nitrobacter)

50. B - The process by which lime is added to clay soils is known as flocculation.

BIOLOGY U. M. E. 1986

1. Viruses are regarded as non-living because they A. can neither reproduce asexually nor sexually B. cannot survive in their respective environments C. do not possess characteristics that can be transmitted from one generation to the next D. can neither respire nor excrete.

2. Which of the following pairs are fully adapted to terrestrial life? A. Ferns and algae. B. Ferns and mosses. C. Bryophytes and flowering plants. D. Flowering plants and conifers

3. Which of these animals is radially symmetrical? A. Squid. B. Hydra. C. Snail. D. Cockroach.

4. Which of the following has cones? A. Angiosperm. B. Gymnosperm. C. Pteridophyte. D. Bryophyte.

5. For effective functioning of a bird's quill feather, hooks fit on the ridges of the A. vane B. Rachis C. barbules D. Barbs.

6. Which of the following is NOT true of Spirogyra? A. Reproduce by conjugation B. reproduce by fragmentation C. Consist of branched filaments D. Consist of unbranched filaments.
7. Which of the following lacks chaetae, tentacles and antennae? A. Snail. B. Crab. C. Millipede. D. Earthworm.
8. Incomplete metamorphosis occurs in the A. butterfly B. Grasshopper C. mosquito D. Housefly.
9. Fishes are cold-blooded because their body temperature is A. constantly low B. constantly high C. dependent on that of their surroundings D. regulated at will.
10. When the original king and queen of termite die, they are replaced by A. the king and queen of another colony B. Some adult reproductives from the same colony C. some adult workers which are specially fed to breed D. developing nymphs nurtured as secondary reproductives
11. The male cockroach differs from the female by having A. mandibles B. a pair of styles C. Spiracles D. apariofscerci.
12. The fins making up the limbs of the bony fish are A. caudal and ventral B. ventral and pelvic C. pelvic and pectoral D. pectoral and dorsal.
13. The stem differs from the root in having the xylem and phloem strands A. on the same radii B. Scattered C. on alternate radii D. towards the pith.
14. Oxygen liberated during photosynthesis has been demonstrated to come from A. carbon dioxide B. Air C. water. D. Chlorophyll
15. Which of these is a trace element? A. Iron. B. Copper. C. Calcium D. Sulphur.
16. The main organic substances found in the human body are A. carbohydrates, proteins and salts B. Salts, fats and proteins C. fats, carbohydrates and proteins D. salts, fats and carbohydrates.
17. Which of the following elements is essential for the formation of haemoglobin? A. Sodium. B. Potassium, C. Calcium. D. Iron.
18. The severe deficiency of vitamin C leads to A. kwashiorkor B. beriberi C. pellagra D. scurvy.
19. In addition to the high calories derived from fats and oils they are A. used in producing new cells B. necessary for enzyme formation C. used as insulators from cold D. required for growth.
20. The extract from a food substance reacting with sodium hydroxide and copper sulphate solutions will produce violet to purple coloration if A. fats are present B. carbohydrate is present C. protein is present D. reducing sugar is present
21. The three important organs that are situated close to the stomach are A. kidney, liver and gall bladder B. pancreas, liver and kidney C. liver, kidney and spleen D. gallbladder, pancreas and spleen.
22. Evidence that a tooth is a living part of the mammalian body can be found within the A. gum B. pulp cavity C. cement D. enamel.
23. Blood circulation in a mammal is said to be double because A. it passes twice through the heart in a complete circuit B. it moves in both arteries and veins C. it circulates in both the heart and other organs D. the heart contains auricles and ventricle
24. Which is the correct order of water loss from the leaf? 1. Mesophyll 2. Veins 3. Substomatal cavity 4. Stomata A. 3 → 2 → 1 → 4 B. 2 → 1 → 3 → 4 C. 2 → 1 → 3 → 4 D. 1 → 2 → 3 → 4
25. The aperture between the left auricle and the left ventricle is guarded by the A. auricular valve B. tricuspid valve C. ventricular valve D. bicuspid valve.
26. A major limitation in the use of the potometer for measuring the rate of transpiration is that A. it is

made of breakable glass material B. it measures the rate of water intake C. it measures the rate of water loss through the stem only D. the movement of the air bubble in the potometer cannot be timed accurately.

27. Which of the following statements is NOT correct with respect to inhalation in mammals? The A. intercostal muscles contract B. diaphragm is raised C. ribs are raised D. pressure of the thoracic cavity decreases.

28. The equation that can be used to summarize the process of anaerobic breakdown of sugar is A. $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$ B. $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$ C. $C_6H_{12}O_6 + 6O_2 + 6CO_2 + 6H_2O + \text{energy}$ D. $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + \text{energy}$.

29. If a person is bitten by a snake on the leg it is advisable for him to A. keep moving so that the venom will ooze out with bleeding B. wash the wound with water containing antiseptic C. bandage the wound so that germs do not get in through D. keep still and apply a tourniquet above the wound.

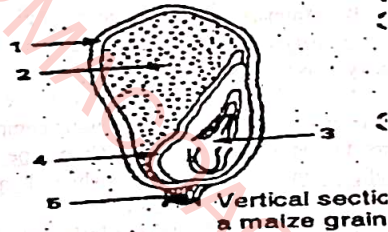
30. Deamination occurs in the A. kidney B. pancreas C. spleen D. Liver.

31. In the mammalian skin, melanin and keratin are contained in the A. sebaceous gland B. sweat gland C. subcutaneous layer D. malpighian layer

32. Two main distinguishing features of the cervical vertebra are the presence of A. a short neural spine and vertebral canal B. a prezygapophysis and cervical ribs C. a large centrum and cervical ribs D. a vertebral canal and large centrum

33. Nastic movement is A. Response to light stimulus B. Non-directional C. Directional D. Response to internal stimulus.

Use the figure to answer questions 34 to 35



34. Which of the labeled parts will develop into a new maize plant? A. 2 B. 3 C. 4 D. 5

35. The structure labeled 1 is the A. Plumule B. Radicle C. Cell membrane D. Seed coat

36. The main function of the structure labeled 2 is to A. Protect the inner parts of the seed B. Nourish the embryo and the growing parts C. Keep the inner parts moist D. Maintain the shape of the seed

37. Gestation in mammals is the period A. Required for growth after birth B. Between the formation of the foetus and birth C. Of development from zygote to birth D. Before the formation of the zygote.

38. If a woman who is a carrier of sickle cell trait (AS) married a man who is a sickler (SS) and they had four children, how many of them would be normal? A. Three B. Two C. One D. None

39. Which of the following is an example of discontinuous variation? A. Skin coloration. B. Left-handedness C. Body weight D. Height.

40. The hormone which regulates the amount of glucose in the blood is called A. Adrenalin B. Auxin C. Insulin D. Thyroxine.

41. An instrument that can be used to demonstrate phototropism and geotropism in plants is the A. Auxanometer B. Potometer C. Kilnstat D. Photometer.

42. In an ecosystem, animals which feed directly on plants are called A. Secondary consumers C. Producers B. Primary consumers D. Predators.

43. In an agricultural ecosystem the biotic component consist of A. Crops, pest and beneficial insects B. Crops, temperature and humidity C. Pests, beneficial insects and water D. Crops water and soil

44. Which of these diseases CANNOT be prevented by immunization? A. Poliomyelitis B. Tuberculosis C. Cholera D. Onchocerciasis

45. Which of the following ecological factors are common to both terrestrial and aquatic habitats? A. Rainfall, temperature, light and wind B. Salinity, rainfall, temperature and light C. Tides, wind, rainfall, and altitude D. pH, salinity, rainfall and humidity.

46. In a community, bacteria and fungi are referred to as A. Producers B. Decomposers C. Scavengers D. Consumers.

47. The swollen shoot disease of cocoa tree is caused by a A. Virus B. Fungus C. Bacterium D. Protozoan

48. A large percentage of tropical soils tend to be acidic because they A. Contain large quantities of potash B. Contain large quantities of lime C. Lose a high proportion of their organic matter to running water D. Lose lime and potash from the top soil through rain action.

49. The following are methods of soil conservation EXCEPT A. Contour terracing B strip cropping C. Contour ploughing D. Mixed grazing.

50. Samples of different soil types are packed in glass tubes whose lower ends are plugged with cotton wool. If these tubes are suspended in a trough of water, water will rise highest after a few hours in A. sand B. loam C. clay D. Humus

1986 U.M.E BIOLOGY SOLUTION

1. D - Viruses can neither respire nor excrete. Also, they always assume crystalline form when out of living cells.

2. D - Bryophytes and pteridophytes require water for reproduction whereas spermatophytes are fully adapted to terrestrial life. Recall that spermatophytes are divided into angiosperms (flowering plants) and gymnosperms (conifers).

3. B - Hydra is radially symmetrical while squid, snail and cockroach are bilaterally symmetrical

4. B - Gymnosperms are cone-bearing while angiosperms are flower-bearing.

5. C - The barbules are mini-barbs that grow from the central shaft of each barb. Some barbules have little hooks known as barbicels. When properly preened, the barbicels all hook up to their nearby barbules.

6. C - Spirogyra is an unbranched filamentous alga.

7. C - The question is a tricky one! If care is not taken, one will hastily conclude that there is no correct option as it appears that at least one of the organisms possesses each of the structures listed. A snail has two pairs of tentacles, a crab has two pairs of antennae and earthworm has many chaetae. Note that antennae and chaetae are plural-forms of antenna and chaetae respectively. Can the same be said of millipede that has only one pair?

8. B - Grasshopper shows incomplete metamorphosis while butterfly, housefly and mosquito show complete metamorphosis.

9. C - Fishes are poikilothermic. Poikilothermic organisms are those whose body temperature depends on that of the external environment.

10. D - When the original king and queen of termites die, they are replaced by developing nymphs nurtured as secondary reproductives.
11. B - A pair of anal styles differentiate a male cockroach from a female one. Male cockroaches have anal styles, female ones don't.
12. C - The fins making up the limbs of the bony fish are the pelvic and pectoral fins. This can be easily guessed if one remembers that the limb girdles in man are pelvic girdle and pectoral girdle.
13. A - In the root, the strands of primary xylem and phloem lie in different radii, separated from one another. In the stem, strands lie side by side in the same radius.
14. C - Oxygen liberated during photosynthesis has been demonstrated to come from water.
15. B - Trace elements are those elements that are required in small quantities while major elements are required in relatively large quantities. Trace elements are also known as micronutrients while major elements are also known as macronutrients. Manganese, zinc, copper, boron, molybdenum, chlorine and nickel are micronutrients while nitrogen, phosphorous, sulphur, potassium, magnesium, calcium and iron are macronutrients.
16. C - The main organic substances found in the human body are fats, carbohydrates and proteins.
17. D - Iron is essential for the formation of haemoglobin.
18. D - The severe deficiency of vitamin C causes scurvy. Kwashiorkor, beriberi and pellagra are deficiency diseases of protein, vitamin B₁ and vitamin B₃ respectively.
19. C - Fats and oils are highly calorific. Besides, they also function as body insulators.
20. C - This is the description of Biuret's test. It is a test for protein. Other tests for protein are xanthoproteic's and million's tests.
21. B - The three important organs that are situated close to the stomach are the pancreas, liver and kidney.
22. B - The pulp cavity is the living part of a mammalian tooth. It is richly supplied with blood vessels.
23. A - Mammals are said to exhibit double blood circulation because the blood passes twice through the heart in complete circuit.
24. C - The correct sequence is: Veins → Mesophyll → substomatal cavity → stomata
25. D - The aperture between the left auricle and the left ventricle is guarded by the bicuspid valve; that between the right auricle and the right ventricle is guarded by the tricuspid valve.
26. D - The major limitation is that the movement of the air bubble in the photometer cannot be accurately timed.
27. A - During inhalation, the external intercostals muscles contract while the internal intercostals muscles relax causing the ribs to move upwards and outwards.
28. D - CO₂ and H₂O are only produced if oxygen is available. The anaerobic breakdown of sugar will yield CO₂ and C₂H₅OH (in plants).
C₆H₁₂O₆ → 2C₂H₅OH + 2CO₂ + Energy
29. D - The person bitten by a snake is advised to keep still and apply a tourniquet above the wound.
30. D - When protein is digested, amino acids are produced. The carboxyl part of excess amino acids are converted into other food classes while the amino parts are broken down to produce urea in a process known as deamination. Deamination occurs in the liver.
31. D - In the mammalian skin, melanin and keratin are contained in the malpighian layer.
32. A - Cervical vertebrae have vertebral canal, through which blood vessels of the neck pass, and short neural spines.
33. B - Nastic movement is non-directional while tactic movement and tropic movement are directional.
34. B - The embryo is contained in the part labeled '3'.
35. D - The part labeled '1' is the fused pericarp and testa.
36. B - The part labeled '2' is the endosperm. The endosperm nourishes the embryo and the growing parts.
37. C - Gestation period refers to the period between pregnancy and birth. It is about 38 weeks in man, 3 weeks in rat, 92 weeks in elephant and 41 weeks in cow.
38. D -
- AS AS SS SS

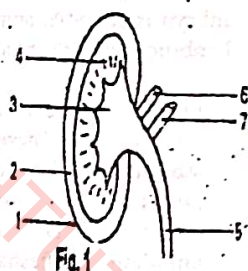
AA = Normal
SS = Sickler
- AS = Carrier
AA = Normal
SS = Sickler
- Thus, it is evident that none of the children will be normal
39. B - Skin coloration, body weight and height are continuous variation variations while left-handedness is a discontinuous variation.
40. C - The amount of glucose in the blood is regulated by insulin and glucagon which are both produced by the pancreas.
41. C - Phototropism and geotropism can be demonstrated using an instrument known as the klinostat.
42. B - Animals that feed directly on plants are called primary consumers; those that feed on the primary consumers are the secondary consumers.
43. A - The biotic component refers to the living parts of an ecosystem while the abiotic component refers to the non-living parts Crops, pest and beneficial insects are biotic while humidity, temperature and water are abiotic.
44. D - Poliomyelitis, tuberculosis and cholera can be prevented by vaccination. Onchocerciasis is caused by Onchocerca volvulus and spread by blackflies. It cannot be prevented by vaccination.
45. A - Rainfall, temperature, light and wind are ecological factors that are common to both terrestrial and aquatic habitats.
46. B - Bacteria and fungi serve as decomposers.
47. A - The swollen shoot disease of cocoa is caused by a virus. The main symptoms include: Interveinal chlorosis, root necrosis, small mottled pods and stem/root swelling.
48. D - A large percentage of tropical soils tend to be acidic because they lose lime and potash from the top soil through rain action.
49. D - Mixed grazing does not conserve the soil in any way.
50. C - The highest rise in water level will be recorded in the tube containing clay followed by the one containing loam and lastly the one containing sand. Yes, capillarity is highest in clayey soil and lowest in sandy soil.

BIOLOGY U.M.E 1985

1. In Spirogyra, the pyrenoidA. excretes waste productsB. is suspended by cytoplasmic strandsC. is mainly used

- forrespirationD. usually contains starch. makes the plant slimy to touch.
2. In which of the following groups of animals are flagella and cilia found? A. FlatwormsB. AnnelidsC. Coelenterates. D. Protozoa. E. Nematodes.
3. Which of the following is seed bearing?A. Mosses. B. Whistling pineC. Algal filaments D. Liverwort. E. Fern fronds.
4. Each of the following is an arthropod EXCEPTthe A. Crab B. Spider C. Snail D. Millipede E. Cockroach.
5. In fish the sense organs which detect movement of the water are located within the A. gills B. Operculum C. nostrilsD. median fins E. lateral line.
6. Euglena is an autotrophic organism because it A. has flagella B. has plant and animal featuresC. is found in water D. can manufacture its foodE. moves fast.
7. Which of the following is NOTtrue of Mucor? It A. contains chlorophyll B. grow saprophyticallyC. bears spores in sporangium D. consists of hyphaeE. reproduces by conjugation.
8. Bryophytes are different from flowering plants because theyA. live in moist habitats. B. are small plants.C. reproduce sexually and asexually.D. have small leaves E. have no vascular tissues.
9. At what stage in the life history of a toad is its mode of breathing similar to that of a fish?A. Tadpole stage. B. External gill stage C. Adult stage D. Internal gill stage. E. Larval stage.
10. In lower plants like mosses, the structure which performs the functions of roots of higher plants is called A. root hairs B. rootlets C. HyphaeD. rhizoids E.Thalli.
11. In an angiosperm leaf, the xylem isA. beside the phloem B. surrounded by the phloemC. above the phloem D. around the phloemE. in separate bundles from the phloem.
12. A group of similar cells performing the same function isA. an organ B. a system C. a tissueD. an organelle E. an enzyme.
13. Which of the following is common to a dicotyl edonous stem and a monocotyledonous root?A. Medullary rays. B. Central pith. C. Wide cortex. D. Narrow cortex. E. Penicyclic fibres.
14. Which of the following represents the sequence of proteinhydrolysis? 1. Polypeptides 2. Amino acids 3. Proteins4. PeptonesA. 3 → 1 → 2 → 4. B. 3 → 2 → 4 → 1 C. 3 → 4 → 2 → 1. D. 3 → 4 → 1 → 2E. 3 → 1 → 4 → 2.
15. A food substance which produces red colouration with Sudan III contains A. protein B. sugar C. Starch D. cellulose E. Fat
16. If calcium is deficient in food this may causeA. anaemia B. retarded growthC. Sterility D. goitre E. Beri-beri
17. Partially digested food ready to leave the stomach is referred to as A.chyme B.curd C.GlycogenD. paste E. Roughage.
18. The function of lymph nodes is toA. supply oxygen B. filterout bacteriaC. form red

- blood cells D. supply amino acids E. supply simple sugars
19. The vein which returns blood from the head and arms to the heart is called A. Aorta B. Inferior vena cava C. Superior vena cava D. Pulmonary vein E. Pulmonary artery.
20. Blood platelets are important because they A. Are amoeboid and nucleated B. Produce antitoxins C. Produce antibodies D. Digest harmful bacteria E. Release thrombin for blood clotting.
21. If a child can receive blood from all donors, he belongs to the blood group A. O B. A C. B D. AB E. AS.
22. Which of the following events does Not occur during anaerobic respiration of glucose? A. Muscle cells produce lactic acid. B. Carbon dioxide is produced. C. Milk bacteria produce lactic acid. D. Energy is not produced. E. Germinating seeds produce alcohol.
23. Identify which of the following are characteristic of the vertebrate respiratory surface. 1. Moist 2. Vascularized 3. Semipermeable 4. Freely permeable 5. Dry A. 1,2,3 B. 1,2,5 C. 2,3,5 D. 2,4,5 E. 1,3,5.
24. In mammals the function of the sebaceous gland is to A. Produce sweat B. Secrete sodium chloride C. Secrete water D. Produce an oily substance E. Manufacture vitamin D for the skin
25. Which of the following organs regulates the amount of amino acids and glucose in the body? A. Kidney. B. Liver. C. Pancreas. D. Spleen. E. Stomach. Use the diagram below to answer questions 26 and 27
26. Bowman's capsules are located in the part labeled A. 1 B. 2 C. 3 D. 4 E. 5.
27. Reabsorption of useful materials takes place in the parts labeled A. 1 and 3 B. 3 and 5 C. 5 and 6 D. 6 and 7 E. 2 and 4.
28. Movements and positions of the head in man are detected by the A. cochlea B. malleus C. Utriculus D. semicircular canals E. outer ear.
29. The appendicular skeleton is made up of the limbs B. skull and limbs C. Phalanges D. ulna and radius E. girdles and limbs.
30. The maize grain is a fruit and not a seed because it A. has a large endosperm B. is formed from an ovary C. is a monocotyledon D. has no plumule and radical E. has a hypogeal germination.
31. If a flower is protandrous then it A. must be unisexual B. has an undeveloped androecium C. has no androecium D. must be insect pollinated E. can prevent self-pollination



32. For pollen to be released in *Crotalaria* the insect must depress the A. wing B. keel C. Standard D. antepetalous stamen E. antepetalous stamen.
33. Irish potato is a A. bulb B. tap root C. Rhizome D. root tuber E. stem tuber
34. The characters by which an organism is recognized are termed A. phenotype B. genotype C. Morphology D. anatomy E. Physiology.
35. The hereditary material in a cell is known as A. ADP B. CNS C. RNAD. ATP E. DNA.
36. A young plant showing yellow leaves is likely to be deficient in A. calcium B. magnesium C. Potassium D. boron E. Molybdenum
37. Germination which results in the cotyledons being brought above ground is called A. hypocotyl B. epicotyl C. Epigeal D. hypogeal E. plumule.
38. The mammalian endocrine system is responsible for A. transmitting impulses B. regulating body temperature C. regulating osmotic pressure of blood D. chemical coordination E. the manufacture of blood.
39. An old man is likely to be long-sighted because age affects the A. optic nerves B. retina C. ciliary muscles D. cornea E. aqueous humour
40. In a mammal, stimulus is transferred from the receptor muscle to the central nervous system through the A. motor neurons B. effector muscles C. Dendrites D. sensory neurons E. synapses.
41. A relationship between living organisms which is of mutual benefit is A. parasitism B. saprophytism C. Ecosystem D. symbiosis E. commensalism.
42. Which of the following food chains is in the correct sequence? A. Weeds → Tadpoles → Beetles → Fish → Man B. Weeds → Tadpoles → Fish → Beetles → Man C. Tadpoles → Beetles → Weeds → Man → Fish D. Man → Fish → Beetles → Tadpoles → Weeds E. Fish → Beetles → Weeds → Man → Tadpoles
43. The primary and secondary hosts respectively of bilharzia are A. fish and man B. man and dog C. snail and man D. man and snail E. fish and snail
44. Which of the following is NOT caused by bacteria? A. Cholera B. Gonorrhoea C. Tuberculosis. D. Onchocerciasis E. Typhoid
45. Tsetse fly is harmful to man because it is associated with the spread of A. river blindness B. Malaria C. sleeping sickness D. leprosy E. Dysentery.
46. Soil erosion CANNOT be controlled by A. planting cover crops B. contouring of sloping ground C. terracing of slopes D. laying of mulch E. burning of bush.
47. Water retention is highest in soils which are rich in A. sand, poor in humus and devoid of clay B. clay and sand, but poor in humus C. Clay and humus, but poor in sand D. clay, poor in humus and devoid of sand E. sand and humus, but poor in clay.
48. The origin of mineral particles in the soil is A. humus B. water C. Micro-

- organisms D. weathered rock E. organic matter.
49. Atmospheric nitrogen is directly replenished in nature through A. the activities of denitrifying bacteria B. the breakdown of ammonium salts in the soil C. the activities of nitrifying bacteria D. the activities of nitrogen-fixing bacteria in root nodules E. egestion, death and decay.
50. The initial volume of water poured into bog of dry soil was 50 ml and the amount that drained through was 35 ml. The percentage water content of the fully soaked soil is therefore A. 46.7 B. 25.0 C. 20.0 D. 30.0 E. 58.3.

1985 U.M.E BIOLOGY SOLUTION

1. D - The pyrenoid performs the basic role of starch storage. In *Spirogyra*, it is located on the chloroplast.
2. D - Flagella, cilia and pseudopodia are locomotory structures of protozoans.
3. B - Spermatophytes are seed-bearing plants. Whistling pines are gymnosperms. Recall that spermatophytes are divided into angiosperms and gymnosperms.
4. C - Crab, spider, millipede and cockroach are arthropods while snail is a molluscan.
5. E - In fish, the sense organs which detect movement of the water are located within the lateral line
6. D - *Euglena* has chloroplast with which it can manufacture its own food. It is therefore said to be autotrophic.
7. A - *Mucor* is a fungus and not a green plant. Thus, it can never contain chlorophyll.
8. E - Thallophytes and bryophytes lack vascular tissues pteridophytes and seed plants (spermatophytes) have vascular tissues.
9. D - The mode of breathing of a tadpole is similar to that of a fish at the internal gill stage.
10. D - Just like the roots of higher plants, the rhizoid in lower plants (such as mosses) supports the plant.
11. E - In an angiosperm leaf, the xylem is in separate bundles from the phloem.
12. C - A collection of similar cells performing the same function is known as a tissue. Tissues will combine to give an organ while organs will combine to give a system.
13. B - A central pith is a feature common to both the monocotyledonous root and the dicotyledonous stem.
14. D - The digestion of protein gives peptone, whose digestion in turn gives polypeptides from whose digestion amino acids are obtained. The sequence is thus: Protein → Peptone → Polypeptide → Amino acid.
15. E - A food substance which produces red colouration with sudan (iii) contains is either fat or oil.
16. B - Deficiency symptoms of calcium are weak, stunted growth and poor root development.
17. A - The partially digested food ready to leave the stomach is known as the chyme.

18. B - The main function of the lymph node is to filter out bacteria.
19. C - Blood from the head and arms are returned to the heart through the superior vena cava while the blood from the lower part of the body are returned through the inferior vena cava.
20. E - Blood platelets (also known as thrombocytes) are responsible for blood clotting.
21. D - A person that can receive blood from all donor belongs to group AB (universal recipient) which a person that can donate to all recipients belong to group O (universal donor).
22. D - Energy is produced in both aerobic and anaerobic respiration, although aerobic respiration produces greater amount of energy.
23. A - The following are the characteristics of respiratory surfaces: (i) They have large surface areas. (ii) They are richly supplied with blood capillaries e.g. they are vascularized. (iii) They are moist (iv) They are covered by thin membrane to allow easy diffusion of gases.
24. D - The function of the sebaceous gland is to secrete an oily substance known as sebum. The sebum lubricates the hair and keeps it flexible. It also contains lysozyme which is antimicrobial.
25. B - The amount of amino acids and glucose available in the body is regulated by the liver.
26. B - Bowman's capsules are located in the cortex of the kidneys.
27. E - Reabsorption of useful materials takes place in the parts labeled '2' and '4'.
28. D - The position and movements of the head in man are detected by the semicircular canals.
29. E - The appendicular skeleton comprises the limbs (fore and hind limbs) and the limb girdles (pelvic and pectoral girdles).
30. B - Fruits are formed from ovaries while seeds are formed from ovules. A maize grain is regarded as a fruit (and not a seed) because fruit wall (pericarp) and the seed coat are fused.
31. E - Dichogamy is one of the features that favour cross pollination. If the male part ripens before the female part, the flower is said to be protandrous. If, on the other hand, the female part ripens before the male, the flower is protogynous.
32. B - For pollen to be released in crotolaria, the insect must depress the keel.
33. E - Cassava is a root tuber while yam, xanthosoma and irish potatoes are stem tubers.
34. A - The physical features of an organism constitute its phenotype.
35. E - Deoxyribonucleic acid (DNA) is the hereditary material in a cell.
36. B - Yellowing of leaves is a sign of chlorosis. The elements that are responsible for chlorophyll formation are magnesium, iron and nitrogen. Thus, the deficiency of any of them will cause chlorosis.
37. C - When the cotyledons are brought above the ground, the germination is said to be epigeal. When the cotyledon remains under the ground, the germination is hypogeal.
38. D - The mammalian endocrine system is responsible for chemical co-ordination while the nervous system is responsible for nervous co-ordination.
39. C - As one ages, the ciliary muscles tend to be weaker.
40. D - Sensory or afferent neurons transmit sensory nerve impulses from sensory receptors into the central nervous system.
41. D - A relationship between living organisms which is of mutual benefit is called mutualism/symbiosis. An example is that between algae and fungi in a lichen.
42. A - Tadpoles will feed on weeds; tadpoles will be eaten by beetles, which in turn will be eaten by a fish. The man eventually feasts on the fish.
43. A - The primary or definitive host of bilharzias or schistosoma is man while water snail is the secondary host.
44. D - Cholera is caused by vibrio cholera, gonorrhea is caused by Nessesireia gonorrhoea, tuberculosis by mycobacterium tubercle and typhoid by salmonella typhimurium which are all bacteria. Onchocerciasis, on the other hand, is caused by a parasitic worm known as Onchocerca volvulus.
45. C - Sleeping sickness or Trypanosomiasis uses the tse-tse fly as its vector.
46. E - Soil erosion can be controlled by planting of cover crops, contouring of slopy ground, terracing of slopes and laying of mulch. Bush burning is not a way of preventing soil erosion.
47. D - Clay soil has the highest water-retaining capacity while sandy soil has the lowest-loamy soil is intermediate.
48. D - The origin of mineral particles in the soil is the weathered rock.
49. A - The question is about how nitrogen is released into the atmosphere. Denitrifying bacteria (such as pseudomonas) are responsible for such.
50. D - Initial volume of water poured = 50ml
Volume of water drained = 35ml
Volume of water retained = 50ml - 35ml = 15ml
Percentage of retained water = $\frac{15}{50} \times 100\%$ = 30%

BIOLOGY U.M.E. 1984

1. The mouth parts of the housefly are adapted for A. lapping and sponging B. sucking and chewing C. piercing and sucking D. chewing and lapping E. biting and chewing.
2. The male toad differs from the female by having A. vocal sacs B. shorter hind limbs C. longer fore limbs D. bulging eyes E. nictating membrane.
3. Mosses, liverworts and ferns can be grouped together because they A. are all

aquatic plants B. all grow in deserts C. are seedless plants D. have undifferentiated plant bodies E. all produce colour less flowers.

4. Spirogyra and Mucor can be grouped together as Thallophyta because A. they are unicellular organisms B. their spores could be dispersed by wind C. they are capable of living independent lives D. they reproduce sexually only E. their bodies are made up of thallus and filaments alternatively.

5. Which of the following invertebrates does NOT possess antennae? A. Centipede. B. Crustacean. C. Millipede D. Insect. E. Spider.

6. Which of the following is INCORRECT? The prothallus of a fern A. is a flattened heart-shaped structure B. is green because its cells contain chloroplasts C. is the dominant plant D. bears the sexual organs E. is attached to the ground by numerous rhizoids.

7. Which of the following cell constituents is NOT common in both plants and animals? A. Mitochondria. B. Chloroplasts. C. Ribosomes. D. Golgi apparatus. E. Vacuoles.

8. The character-producing factors in living organisms are A. chromomeres B. alleles C. Chromatids D. chromosomes E. Genes

9. A mixture of mercurous and mercuric nitrates is added to a food substance A white precipitate is formed which on gentle heating turns red. The food substance is A. protein B. oil C. Carbohydrate D. fat E. fatty acid

10. The mammalian organ through which nourishment and oxygen diffuse into a developing embryo is called A. amnion B. Chorion C. Umbilical cord D. oviduct E. Placenta.

11. Fig. 1 represents a quill feather. The structure labeled 'M' is the A. quill B. rachis C. superior umbilicus D. inferior umbilicus E. aftershaft.



12. Osmosis can be defined as the movement of A. molecules from solution of high concentration to low concentration B. molecules from solution of low concentration to high. Concentration C. Water from solution of high concentration to low concentration D. water across a semi-permeable membrane from solution of low concentration to high concentration E. water across a semi-permeable membrane from solution of high concentration to low concentration.

13. Which of the following statements is NOT true of enzymes? They A. are proteins B. need cofactors to activate them C. are sensitive to hydrogen ion concentration D. are specific in their action E. can withstand high temperatures.

14. The dorsal and anal fins of fish are used for A. upward movements B. controlling

- rolling movements C. downward movements D. Steering E. Buoyancy
15. Exoskeleton is Not found in the A. maggot B. mosquito larva C. Earthworm D. caterpillar E. Termite.
16. Blood clotting is initiated by A. leucocytes B. platelets C. Haemolymph D. haemoglobin E. Erythrocyte
17. Pepsin is a digestive enzyme which breaks A. cellulose into glucose molecules B. carbohydrates into simple sugars C. protein into peptones D. fats into glycerol and fatty acids E. sucrose into glucose and fructose.
18. Anaerobic respiration in yeast produces A. carbon dioxide and ethanol B. carbon dioxide and water C. carbon dioxide and oxygen D. carbon dioxide and glucose E. ethanol and water.
19. Underground stems which grow horizontally through the soil are A. bulbs B. rhizomes C. Runners D. corms E. Stolons.
20. A man with a normal haemoglobin (AA) marries a woman who has sickle-cell haemoglobin (SS). They have a child who has a sickle-cell trait. Which of the following genotypes could be associated with the child's haemoglobin? A. AA B. OO C. AO D. AS E. SS
21. In a Biuret test, some protein was mixed with sodium hydroxide solution. Which of the following chemicals should be added to the mixture for a positive result? A. Mercurous nitrate. B. Copper sulphate C. Mercuric nitrate D. Sodium carbonate E. Ammonium hydroxide
22. The removal of a man's pancreas by surgical operation can affect only the digestion of A. starch B. starch proteins and fats C. oils and fats D. Proteins E. carbohydrates and fats.
23. The parts used by the tapeworm to fasten itself to the host's intestine are the A. neck and suckers B. hooks and suckers C. rostellum and suckers D. young proglottis and neck E. rostellum hooks and suckers.
- Use Fig. 2 to answer questions 24 and 25
24. The young chick is formed from A. 3 B. 3 and 4 C. 1, 3 and 5 D. 2 E. 4.
25. Which parts provide food for the developing chick? A. 2 and 3. B. 4 and 5 C. 3 and 4 D. 2 and 5 E. 1 and 2
26. Which of the following types of vertebrae occur in equal numbers in the rabbit, rat and man? A. Caudal. B. Thoracic C. Lumbar D. Cervical E. Sacral
27. Which of the following statements is NOT true of the piliferous layer of a root? It A. has a very thin cuticle B. Is the outermost layer of the cortex C. may bear root hairs D. breaks down as the root ages E. is replaced by cork in old roots.
28. A lowering plant is monoecious if A. the androecium is found on one plant B. the gynoecium is monocarpous C. it produces

- essential organs D. the gynoecium and androecium are on the same plant E. the flowers are unisexual
29. How many nuclei are found in a pollen tube during fertilization? A. 2 B. 3 C. 5 D. 6 E. 7
30. Which of the following is NOT a waste product of plants? A. Tannins. B. Oxygen. C. Carbon dioxide. D. Sap E. Alkaloids.
31. If an animal is very active and has good muscular control, it is likely to have well-developed A. olfactory lobes B. cerebral hemispheres. C. optic lobes D. Cerebellum E. spinal cord.
32. Which of the following adaptations is NOT concerned with the flight of birds? A. Streamlined Shape B. Presence of powerful muscles C. Reduced body weight D. Broad sternum E. Webbed feet.
33. The transect method can be used in ecology to show the A. number of plants and animals in a habitat B. population of a particular plant species C. distribution of organisms along a line D. heights of trees in a section of a forest E. number of young plants across a forest.
34. Asexual reproduction does NOT occur in A. Mucor, Spirogyra and Paramecium B. Penicillium, Paramecium and Amoeba C. Mucor, Rhizopus and Penicillium D. Amoeba, Spirogyra and Mucor E. Rhizopus, Ascaris and Amoeba.
35. Fehling's solution will readily change colour from blue to a reddish colour when 1 is A. mixed with sugar solution in the cold B. warmed or heated by itself C. mixed with reducing sugar in the cold D. warmed or heated with a complex solution E. warmed with a solution of reducing sugar.
36. The presence of diastema in the jawbone indicates that the mammal lacks the teeth suitable for A. tearing B. chewing C. Cutting D. chewing and tearing E. cutting and grinding.
37. Normally the flow of blood is NEVER from A. artery to arterioles B. arterioles to capillaries C. capillaries to venules E. arterioles to the artery E. venules to the vein.
38. Heat produced in tissue respiration in plants is A. a chemical form of energy B. the only form of energy C. the main form of energy D. a useful form of energy E. a waste form of energy.
39. The axial skeleton of a mammal does not include the bones of the A. skull B. tail C. Limbs D. back E. Neck
40. Which of the following sequences represents the process of blood clotting? 1. Fibrin forms a network of threads 2. Red blood cells are caught and a clot is formed 3. Fibrinogen in plasma changes into soluble fibrin 4. Blood is exposed to air A. 4, 3, 2, 1 B. 4, 3, 1, 2 C. 3, 1, 4, 2 D. 1, 2, 3, 4. E. 3, 1, 2, 4.
41. Green plants are important in the ecosystem because they are A. primary consumers B. Producers C. decomposers D. secondary consumers E. Scavengers.
42. An anemometer is an instrument for measuring A. relative humidity B. Altitude C. wind speed D. turbidity E. Salinity.

43. Which of the following is NOT regarded as a pollutant on land or in the air? A. Smoke B. Noise. C. Sulphur dioxide D. carbon monoxide E. Nitrogen.
44. Which of the following groups of factors is completely abiotic? A. Salinity, tide, plankton, turbidity. B. Temperature, pH, soil, insect. C. Wind, altitude, humidity, light. D. Conifers, wind, pH, rainfall. E. Soil, water, bacteria, salinity.
45. Which of the following lists of diseases, their causes and transmission is CORRECT? A. Cholera, virus, severe diarrhoea, infected water B. Malaria, protozoan, high fever, contact with infected person. C. Syphilis, virus, venereal disease, sexual intercourse. D. Smallpox, virus, skin with blister, close contact with infected person E. Sleeping sickness, bacteria, tiredness, headache and dozing, tsetse fly bite.
46. Erosion can be reduced along a slope by A. ridging across slope B. ridging up slope C. ridging down slope D. crop rotation E. bush following system
47. If a handful of soil is shaken with water and left to settle, the soil particles will settle from light to heavy particles as follows A. humus, clay, silt, sand, stones B. humus, silt, clay, sand, stones C. humus, clay, slit, stones, sand D. humus, sand, silt, clay, stones E. clay, humus, silt, land, stones,
48. Denitrifying bacteria in nature liberates gaseous nitrogen directly from A. ammonium salts B. soil nitrates C. thunderstorms D. soil nitrites E. plant and animal proteins.
49. Leaching is A. washing away of humus from the soil surface B. reduction of soil aeration by pressure C. soil erosion by means other than rainfall D. loss of organic matter due to exposure to direct sunlight E. washing out of chalk and limestone from upper layers of soil by heavy rains.
50. The process of soil erosion is usually from A. rill → sheet → gully B. gully → rill → sheet C. sheet → gully → rill D. sheet → rill → gully E. rill → gully → sheet

1984 U.M.E BIOLOGY SOLUTION

1. A - Houseflies have mouthparts modified for sponging and lapping, butterflies have mouth parts adapted for sucking, mosquitoes have piercing and sucking mouthparts while grasshoppers and cockroaches have biting and chewing mouthparts.
2. A - The male toad has vocal sacs while the female doesn't.
3. C - Mosses, liverworts and ferns are all seedless plants. The spermatophytes are the only group of plants that produce seeds.
4. E - Spirogyra and Mucor can be grouped together as thallophyta because their bodies are made up of thallus and filaments alternatively.
5. E - Arachnids (e.g. spider) are the only arthropods without antennae.



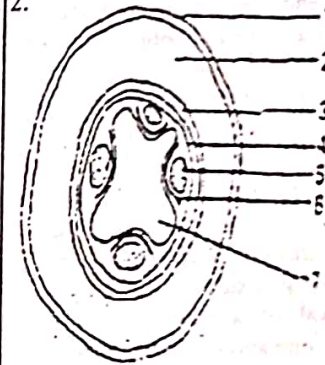
Fig. 2. Transverse section of a fowl's egg

6. C - The gametophyte of a fern arises from the prothallus. The dominant form of a fern (pteridophyte) is the sporophyte; not the gametophyte.
7. B - Chloroplast is absent in animals.
8. E - The genes are the character-producing factors in living organisms.
9. A - A food substance which produces white precipitate which turns red on gentle heating with a mixture of mercurous and mercuric nitrate must contain protein.
10. E - The placenta is the mammalian organ through which nourishment and oxygen diffuse into a developing embryo and through which waste products diffuse from the foetal blood into the maternal blood.
11. C → J → Vane; K → Shaft; L → Aftershaft; M → Superior umbilicus; N → Quil; O → Inferior umbilicus.
12. D - Osmosis is the movement of water from the region of low concentration to the region of high concentration across a semi-permeable/selectively permeable/differentially permeable membrane.
13. E - Enzymes cannot withstand high temperatures; high temperatures destroy enzymes.
14. B - The dorsal fin is used as a stabilizer that keeps the fish steady when swimming. It is also used as a weapon of defense. The anal fin acts as a stabilizer and helps to maintain a straight course during swimming.
15. C - The earthworm does not possess exoskeleton. Instead, it has hydrostatic skeleton.
16. B - Blood clotting is initiated by platelets. Platelets are also known as thrombocytes.
17. C - Protein is converted to peptones through the action of pepsin. Trypsin converts peptone to polypeptide while erepsin convert polypeptide to amino acids.
18. A - Anaerobic respiration in yeast produces carbon dioxide and ethanol.
 $C_6H_{12}O_6 \rightarrow 2CO_2 + 2C_2H_5OH + \text{Energy}$
19. B - A rhizome is a thick fleshy underground stem which grows more or less horizontally beneath the surface of the soil.
20. D - AA → Normal; AS → Carrier (has the trait); SS → Sickler
21. B - The two chemical compounds employed during the Biuret's test for protein are sodium hydroxide and copper sulphate.
22. B - Pancreas produce amylase, lipase and trypsin which act on carbohydrate, fats and proteins respectively. Thus, the removal of a man's pancreas will affect the digestion of those food classes.
23. B - The tapeworm uses its hooks and suckers to fasten itself to the host's intestine. It uses its entire body to absorb nutrient from the host's intestine.
24. D - The part labeled '2' is the germinal disc, the part where the young chick is formed from.
25. C - The part labeled '3' is the yolk while '4' is the albumen. Both the yolk and albumen are to nourish the embryo.
26. D - The cervical vertebrae are present in equal numbers in rabbit, rat and man. Each of the listed animals have seven cervical vertebrae.
27. A - The piliferous layer does not have cuticle.
28. D - A flowering plants is monoecious if both the gynoeceum and androeceum are present on the same plant and dioecious if they are present on different plants.
29. B - At the initial stage, the pollen grain has only one nucleus which later divides into two nuclei - the tube nucleus and the generative nucleus. The generative nucleus eventually divides into two male nuclei.
30. D - The waste products in plants include carbon dioxide, oxygen, water, tannins, acids, resins, mucilage, latex, oils, gums, anthocyanin and alkaloids.
31. D - The cerebellum controls posture or balance of the body. It also co-ordinates the various muscle actions.
32. E - The possession of webbed feet is not an adaption for flight in birds.
33. B - The transect method can be used to determine the type and number of plant species in a given habitat.
34. E - Ascaris does not reproduce asexually.
35. E - Fehling's solution will change colour from blue to red, when it is warmed with a solution of reducing sugar. Reducing sugars are glucose, galactose, fructose, mannose, maltose and lactose i.e. all monosaccharides and disaccharides (except sucrose).
36. A - Herbivores do not have canines as canines are adapted for tearing flesh and herbivores do not eat flesh. The space thus created between the incisors and premolars is known as diastema.
37. D - Blood flows from the artery to arterioles and not otherwise.
38. A - Heat Produced in tissue respiration comes from a chemical reaction.
 $C_6H_{12}O_6 \rightarrow 6CO_2 + 6H_2O + \text{Energy}$
39. C - The axial skeleton of a mammal does not include the bones of the limbs. Limbs and limb girdles constitute the appendicular skeleton.
40. B - The right sequence is: 4 → 3 → 1 → 2
41. B - Green plants are the producers.
42. C - The anemometer is an instrument that measures the speed of the wind while the direction of the wind is measured by the wind vane.
43. E - Nitrogen is not considered a pollutant in any ramification.
44. C - Wind, attitude, humidity and light are all abiotic factors.
45. D - Smallpox is caused by a virus. *One of its symptoms is the presence of blister on the skin surface. *It can be contracted through a close contact with an infected person.
46. A - Erosion can be reduced by constructing ridges across slopes.

47. A - The most coarse of them all (the heaviest) is stone, followed by sand, followed by silt, followed by clay and finally the humus.
48. B - Denitrifying bacteria liberate gaseous nitrogen into the atmosphere from soil nitrates. Examples are alkali genes and pseudomonas.
49. A - The washing away of humus from the soil surface is rightly described as leaching.
50. D - There are four main types of erosion: splash erosion, sheet erosion, rill erosion and gully erosion. Splash erosion is the first and least severe stage in the soil erosion process, followed by sheet erosion, then rill erosion and finally gully erosion.

BIOLOGY U.M.E 1983 QUESTIONS

1. Root hairs are developed from the A. root apex B. epidermis of roots C. vascular bundles D. endodermis E. Pericycle. Use Fig. 2 to answer questions 2-4 Fig. 1 represents a cross section of part of a dicot plant.



- Which of the following features can be used to identify Fig. 1? A. Position of 7 B. Its circular nature C. Number of 5 D. Presence of 3 E. Width of 2
2. The main function of 6 is to A. separate 5 from 7 B. produce more of 5 and 7 C. Produce cork D. translocate water and mineral salt E. Conduct carbon dioxide to the other parts
3. The main function of 4 is to A. Surround the inner tissues B. produce cork surround the inner tissues C. produce root hairs D. produce lateral roots E. produce more of 3.
4. In a dicot leaf, guard cells differ from other epidermal cells because they A. have no definite shape B. lack nuclei C. are smaller D. contain chloroplasts E. lack vacuole
5. Which of the following structures is NOT found in the female agama lizard? A. Pre-anal pads B. Eardrum C. Gular fold D. Nasalscale E. Nuchal crest
6. Herbs differ from shrubs because they A. do not produce fruits B. are useful to herbalists C. don't become woody D. are only annuals E. are only perennials.
7. If an isolated living cell is left in distilled water for two hours, it is likely to A. lose some of its water to the surrounding water B. lose all of its water to the surrounding water C. reproduce by binary fission D. become more turgid E. die due to excess water
8. If an organic compound has its Hydrogen: Oxygen ratio as 2:1, it is likely to be A. a protein B. a carbohydrate C. a fat D. a fatty acid and glycerol E. an amino acid.

10. Which of the following elements are necessary for the formation of chlorophyll in a plant? A. Magnesium and iron B. Calcium and potassium C. Calcium and sulphur D. Potassium and sulphur E. Phosphorus and potassium.
11. Which of the following statements is NOT true of mammalian erythrocytes? A. They have haemoglobin B. They appear yellow when looked at singly C. They are disc-shaped D. The cells are more numerous than leucocytes E. They have nuclei at maturity.
12. In woody plants, gases and water vapour are transported across the stems by the A. Xylem fibres B. Medullary rays C. Sieve tubes D. Phloem fibres E. Pbleom
13. Which of the following substances is NOT found in urine? A. Water B. Sodium chloride C. Nitrogenous compounds. D. Calcium chloride E. Nitrogenous salts.
14. The kidneys of all vertebrates act as osmoregulators. This means that they A. keep the composition of the plasma constant B. regulate osmotic processes C. control the volume of blood entering the kidneys D. decrease the osmotic pressure of blood E. increase the osmotic pressure o blood
15. The movement of part of a plant in response to external stimulus of no particular direction is A. taxism B. Tropism C. haptotropic movement D. nastic movement E. Phototropism
16. The part of the mammalian brain responsible for maintaining balance is the A. medulla oblongata B. olfactory lobe C. cerebellum D. Cerebrum E. frontal lobe.
17. Which of the labeled parts in Fig. 2 will develop into a new bulb A. 1 B. 4 C. 2 D. 3 E. 5

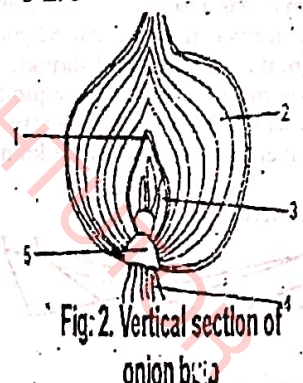


Fig. 2. Vertical section of onion bulb

In the onion bulb, food is stored in the A. stem B. lateral buds C. cotyledons D. outer scale leaves E. Leaf bases.

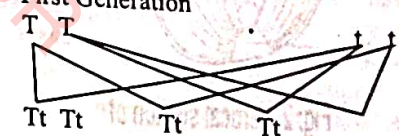
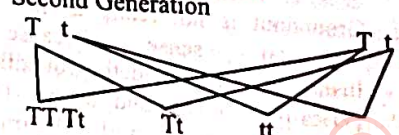
19. Groundnut is not really a 'nut' in the biological sense because A. It is harvested from inside the ground B. Its pericarp is not hard and tough C. The fruit is not as hard as coconut D. The fruit is not succulent E. It is an achene.
20. What type of fruit is formed from a single flower having several free carpels? A. Multiple fruit B. Simple fruit C. Aggregate fruit D. Dehiscent fruit E. indehiscent
21. 28 g of soil sample was heated to a constant weight of 24 g. When further heated to red hot and cooled, it weighed 18 g. What is the percentage of humus in the soil? A. 22.2 B. 55.6 C. 75.0 D. 25.0 E. 35.7
22. Which of the following diseases is NOT caused by a virus? A. Rinderpest B. Maize

- rust C. Newcastle disease D. Swine fever E. Cassava mosaic disease
23. A centipede differs from a millipede by its A. colour B. numerous abdominal segments C. paired legs on each abdominal segment D. poison claws E. cylindrical body
24. An organism having one pair of identical genes is A. a heterozygote B. a hybrid C. an allelomorph D. a homozygote E. a diploid
25. Plants which can survive in places where the water supply is limited are A. bryophytes B. mesophytes C. xerophytes D. hydrophytes E. Pteridophytes
26. Banana, plantain and pineapple can be grouped together because they A. produce small seeds B. are multiple fruits C. produce suckers D. have runners E. have bulbils.
27. One disease NOT caused directly by bacteria is A. malaria B. tuberculosis C. Pneumonia D. Tetanus E. Cholera.
28. In what order do the following structures develop during the metamorphosis of the toad? 1. External gills 2. Internal gills 3. Forelimbs 4. Hindlimbs 5. Mouth A. 12345 B. 15243 C. 21345 D. 53412 E. 54321
29. The dental formula $i \frac{3}{3} . c \frac{1}{1} . pm \frac{4}{4} . m \frac{2}{3} = 42$ represents that of a A. rabbit B. full grown man C. young child D. dog E. Sheep.
30. Which of the following statements is NOT true of insectivorous plants? A. They obtain part of their food by trapping and feeding on insects B. They attract insects simply because of pollination. C. The can grow in soils poor in nitrogenous salts. D. They can supplement their nitrogen supply by feeding on insects. E. Examples include butterworts, sundews and pitcher plants.
31. Which of these worms is beneficial to man? A. Hookworm B. Tapeworm C. Roundworm D. Earthworm E. Guinea worm
32. Starting from the skull end, the vertebrae are arranged in the following order: A. axis, atlas, cervical, thoracic and lumbar B. atlas, cervical, axis, thoracic and lumbar C. atlas, axis, cervical, thoracic and lumbar D. atlas, axis, cervical, thoracic and lumbar E. atlas, thoracic, cervical, axis and lumbar.
33. Which of the following diseases could be exclusively associated with a river basin? A. Malaria. B. Syphilis. C. Onchocerciasis D. Cholera. E. Poliomyelitis.
34. Which of the following represents the evolutionary sequence in these plants? 1. Flowering plants 2. Ferns 3. Mosses 4. Algae 5. Conifers A. 2 → 1 → 4 → 3 → 5 B. 5 → 4 → 3 → 2 → 1 C. 2 → 4 → 5 → 1 → 3 D. 3 → 2 → 4 → 5 → 1 E. 4 → 3 → 2 → 5 → 1
35. Which of the following will NOT allow osmosis to take place? A. Pig's bladder. B. Cellophane. C. Parchment paper. D. Transparent polythene E. Cows bladder
36. Which of the following statements on the mammalian circulatory system is

- NOT true? A. Blood in the pulmonary artery is richer in oxygen content than blood in the pulmonary vein. B. The blood in the hepatic portal vein is the richest in food substances C. Blood flow is controlled by valves in the veins. D. Arteries are generally thicker and larger than veins E. Fibrin helps in the formation of blood clots.
37. In a positive phototropic response of a coleoptile, the region of greatest curvature is brought about by the A. Movement of auxins away from the region of curvature B. even distribution of auxins in all parts of the coleoptiles C. inhibition of growth by auxins in the region of smaller curvature D. concentration of auxins in the region of curvature E. absence of auxins in the coleoptile.
38. The tuber of cassava is NOT a stem tuber because it A. is distended with food reserve B. has an aerial shoot portion C. has other structures that could be called roots D. lacks axillary buds E. has a bark over its stored food.
39. The function of the ossicles (malleus, incus and stapes) in the mammalian ear is the A. transmission of vibrations B. regulation of pressures C. Support of the inner ear D. maintenance of balance during motion E. secretion of oil
40. Which of the following instruments is used for determining turbidity of water? A. Thermometer. B. Secchi Disc. C. Rain Gauge. D. Hygrometer. E. Wind Vane.
41. Which of the following is NOT characteristic of monocot plants? A. Occurrence of secondary thickening B. Parallel venation C. Scattered vascular bundles D. Floral parts arranged in threes E. Perianth is usually insignificant.
42. Which sequence represents the correct order of organisms in a food chain? 1. Toad 2. Mucuna 3. Grasshopper 4. Snake 5. Hawk A. 5 → 4 → 1 → 3 → 2 B. 1 → 2 → 3 → 4 → 5 C. 2 → 1 → 3 → 4 → 5 D. 2 → 3 → 1 → 5 → 4 E. 2 → 3 → 5 → 4 → 5
43. In Rhizopus, carbohydrate is stored in the form of A. glucose B. paramylon C. Glycogen D. starch E. Oil
44. Which of the following statements about the rate of transpiration is INCORRECT? It is A. dependent on temperature B. affected by changes in light intensity C. unaffected by humidity D. dependent on air movement E. affected by availability of water.
45. Jointed skeleton is absent in the A. cockroach B. spider C. Millipede D. snail E. dragonfly
46. Which of the following statements about the dentition of man is INCORRECT? Man has A. more molars than incisors B. no diastema C. the same number of teeth on upper and lower jaws D. a total of thirty-two teeth E. a total of six molars.
47. When a spirogyra cell is immersed in a salt solution more concentrated than its cell sap, it A. remains unchanged B. takes up water

- and bursts C. absorbs a little water D. loses water and shrivels E. becomes sturgid.
48. Urea is produced in the A. liver B. bladder C. Spleen D. kidneys E. gall. bladder.
49. What is the genetic ratio of the F_2 generation if members of F_1 generation are allowed to self-pollinate? A. 1 tall:3 short B. 3 tall: 1 short C. 1 tall: 1 short D. 4 short: 0 tall. E. 4 tall: 0 short.
50. The path taken by glucose from the ileum to the heart is A. ileum \rightarrow hepatic portal vein \rightarrow hepatic artery \rightarrow vena cava \rightarrow heart B. ileum \rightarrow hepatic portal artery \rightarrow hepatic artery \rightarrow vena cava \rightarrow heart C. ileum \rightarrow hepatic portal vein \rightarrow vena cava \rightarrow heart D. ileum \rightarrow hepatic vein \rightarrow vena cava \rightarrow heart E. E. ileum \rightarrow hepatic portal vein \rightarrow hepatic vein \rightarrow vena cava \rightarrow heart
- 1983 U.M.E BIOLOGY SOLUTION**
- B - In young roots, epidermal cells often form extension called root hairs which are specialized for absorbing water and minerals.
 - A - The cross section can be identified by the position of the vascular bundle.
 - B - The part labeled '6' is the cambium. It produces more of phloem (5) and xylem (7).
 - A - The part labeled '4' is the pericycle. The pericycle surrounds the inner tissues.
 - D - Guard cells are the only epidermal cells that have chloroplasts.
 - E - The possession of spiny posteriorly pointed single row of scales known as nuchal crest may be employed to differentiate a male lizard from a female one; while male lizards possess it, female ones do not.
 - C - Herbs differ from shrubs as they do not become woody.
 - D - The content of a living cell will be hypertonic to water. Hence, water will move into the cell, making it turgid.
 - B - Carbohydrates contain carbon, hydrogen and oxygen, with hydrogen and oxygen present in the 2:1 e.g. $C_6H_{12}O_6$, $C_{12}H_{22}O_{11}$, $C_5H_{10}O_5$ etc.
 - A - The elements necessary for the formation of chlorophyll are magnesium, iron and nitrogen.
 - E - Red blood cells (also known as erythrocytes) are anucleated i.e. they do not have nuclei.
 - A - Water is transported across the stem by the xylem.
 - D - Calcium chloride is not a component of urine
 - A - The kidneys of all vertebrates act as osmoregulators i.e. they act to keep the composition of the plasma fairly constant.
 - D - Tropism and taxis are directional movements while nastism is a non-directional movement.
 - C - The part of the mammalian brain responsible for maintaining balance is the cerebellum.
 - D - The part labeled '3' will develop into a new bulb.
 - E - In the onion bulb, food is stored in the leaf bases.

19. B - Groundnut is not really a 'nut' in the biological sense because its pericarp is not hard and tough.
20. C - Aggregate fruits are formed from a single flower in which the gynoecium consists of many free carpels.
21. A - The first heating eliminates water while the second one is to eliminate humus.
Mass of humus = $24g - 18g = 6g$.
Original mass of the soil = $28g$
Percentage of humus in the soil = $\frac{6}{28} \times 100\% = 21.43\%$
22. B - Rinderpest, Newcastle disease, Swine fever and Cassava mosaic disease are caused by viruses. Maize rust is a fungal disease. The common rust is caused by a fungus known as puccinia sorghi.
23. D - A centipede has poison claws while a millipede does not.
24. D - An organism that has one pair of identical genes is a homozygote while the one having dissimilar ones is a heterozygote.
25. C - Plants which can survive dry conditions are called xerophytes. Cactus is a good example.
26. C - Banana, plantain and pineapple can be grouped together because they produce suckers. Suckers are underground young plants which develop from the auxiliary buds of the parent plant.
27. A - Malaria is caused by a protozoan blood parasite known as *Plasmodium*. The parasite is transmitted by the bite of a female anopheles mosquito.
28. B - External gills \rightarrow Mouth \rightarrow Internal gills \rightarrow Hind limbs \rightarrow Forelimbs.
29. D - Dental formula of a dog: $I = \frac{3}{3}, C = \frac{1}{1}, P = \frac{4}{4}, M = \frac{2}{3}$
Dental formula of a man: $I = \frac{3}{3}, C = \frac{1}{1}, P = \frac{2}{2}, M = \frac{3}{3}$
Dental formula of a rabbit: $I = \frac{3}{3}, C = \frac{1}{1}, P = \frac{2}{2}, M = \frac{3}{3}$
30. B - The reason why insectivorous/carnivorous plants trap insects is to obtain nitrogenous compounds from them.
31. D - Earthworms are beneficial to man because they help to improve the structure of soil.
32. D - The sequence is: Atlas \rightarrow Axis \rightarrow Cervical \rightarrow Thoracic \rightarrow Lumber \rightarrow Sacral \rightarrow Caudal
33. C - Onchocerciasis is associated with river. In fact, its alternative name, river blindness has said it all!
34. E - Schizophytes \rightarrow Thallophytes (e.g. algae) \rightarrow Bryophyte (e.g. Mosses) \rightarrow Pteridophyte (e.g. ferns) \rightarrow Gymnosperm (conifers) \rightarrow Angiosperms (flowering plants).
35. D - Pig's bladder, cow's bladder, parchment paper and cellophane can act as selectively permeable membrane across

- which osmosis will take place while transparent polythene cannot.
36. A - The pulmonary artery carries deoxygenated blood from the heart to the lungs for oxygenation while the pulmonary vein returns the oxygenated blood into the heart. Thus, the blood in the pulmonary vein will be richer in oxygen than the one in the pulmonary artery.
37. A - The side of the shoots receiving light has lower amount of auxin than the other side. There is more growth on the side with higher concentration of auxins and little growth on the other side. This unequal growth causes the shoots to bend to the side where growth is reduced, that is towards the direction of light.
38. D - The tuber of cassava is not a stem tuber because it lacks auxiliary bud. Instead, it is a root tuber. All root tubers lack scale leaves and auxiliary buds. Adventitious buds are, however, present.
39. A - The function of the ossicles in the mammalian ear is the transmission of vibrations.
40. B - The turbidity of water is determined using an instrument known as the seecchi disc.
41. A - Secondary thickening is a feature of dicot plants, not that of monocot plants.
42. E - The sequence of the organisms in the food chain is: Mucuna \rightarrow Grasshopper \rightarrow Toad \rightarrow Snake \rightarrow Hawk.
43. C - Carbohydrate is stored as starch in plants and as glycogen in animals and fungi.
44. C - Relative humidity affects the rate of transpiration. The higher the relative humidity, the lower the rate of transpiration and vice-versa.
45. D - Jointed skeleton is a feature of arthropods, not that of molluscs.
46. E - A man has a total of twelve molars.
47. D - When any cell is placed in a hypertonic solution, it loses water and shrinks.
48. A - One must not confuse the production of urea with its excretion. Urea is produced in the liver and excreted by the kidney.
49. B -
- First Generation
- T T
- 
- Second Generation
- T t
- 
- Thus, the ratio of tall plants to short plants in the second generation is 3:1
50. E - The path taken by glucose from the ileum to the heart is: Ileum \rightarrow Hepatic portal vein \rightarrow Hepatic vein \rightarrow Inferior vena cava \rightarrow Heart.