ARADA SUB-CITY EDUCATION BUREAU
BIOLOGY MODEL EXAMINATION FOR GRADE 12 STUDENTS
TIR 2018/ JANUARY 2026

TIME ALLOWED: 2 hours

GENERAL DIRECTIONS

IN THIS EXAMINATION THERE IS TOTAL OF 100 MULTIPLE QUESTIONS. CAREFULLY SELECT ONE BEST ANSWER FOR EACH QUESTION AND BLACKEN THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED.

FOLLOW THE INSTRUCTIONS ON THE ANSWER SHEET AND THE EXAMINATION PAPER CAREFULLY.

USE ONLY PENCIL TO MARK YOUR ANSWERS. YOUR ANSWER MARK SHOULD BE HEAVY AND DARK, COVERING THE ANSWER SPACE COMPLETELY.

YOU ARE ALLOWED TO WORK ON THE EXAMINATION FOR 2:00 HOURS. WHEN TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING, PUT YOUR PENCIL DOWN, AND WAIT FOR FURTHER INSTRUCTIONS.

ANY FORM OF CHEATING OR AN ATTEMPT TO CHEAT IN THE EXAMINATION ROOM WILL RESULT IN AN AUTOMATIC DISMISSAL FROM THE EXAMINATION ROOM AND CANCELLATION OF YOUR SCORE(S)

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

1. Professor Tilahun Yilma is well known internationally for his work on
   A. developing molluscicide C. developing a vaccine for rinderpest
   B. to safeguard biodiversity D. developing commercial hybrid strain of sorghum
2. Which of the following research institute carries out research on leprosy, tuberculosis, leishmaniasis, malaria and HIV/AIDS?
   A. Armauer Hansen Research Institute (AHRI)
   B. Institute of Biodiversity Conservation (IBC)
   C. Aklilu Lemma Institute of Pathobiology (ALIPB)
   D. Institute of Agricultural Research (IAR)
3. Which one of the following is the disadvantage of electron microscope?
   A. It does not allow as to observe live specimen
   B. It shows the inside details of a specimen
   C. It shows us the three-dimensional shape of a specimen
   D. It produces the image of the specimen on a screen
4. Electron microscope differ from light microscope in that:
   A. Electron microscope has higher magnification and resolution power
   B. Electron microscope uses a beam of light
   C. Electron microscope enables us to observe specimens in a greater detail
   D. All are correct answers
5. What is the function of ribosomes?
   A. Produces antibodies C. Covers the cell
   B. Protein synthesis D. Carry out respiration
6. An animal cell is placed in a certain solution then the cell swells and gradually bursts, the solution is said to be_____ to the cell.
   A. Neutral B. hypertonic C. Hypotonic D. Isotonic
7. Turgor pressure and plasmolysis happen in plant cells when
   A. the cell is hypotonic and the environment is hypertonic, respectively.
   B. excess water enters into the cells, and much water is lost from the cells, respectively.
   C. the cell and the environment are isotonic, and the environment is hypotonic, respectively
   D. excess water is lost from the cells and excess water enters into the cells, respectively.
8. Which of the following double sugar is found in milk?
   A. Lactose B. Maltose C. Sucrose D. Cellobiose
9. Why do we need a balanced diet? To
   A. prevent infection by syphilis C. become very tall
   B. gain excessive weight D. maintain a healthy growth
10. Microscopic, finger-like projections that are found on the inner walls of the small intestine are responsible for
   A. ingestion B. excretion C. digestion D. absorption

11. Which of the following structures controls the outflow of gastric contents into the duodenum?
    A. Cardiac sphincter
    B. Pyloric sphincter
    C. Esophageal sphincter
    D. Urethral sphincter
12. The process of converting lipid into fat droplets is called
    A. mastication B. peristalsis C. emulsification D. assimilation
13. In which structure of the lungs does exchange of gases with the blood vessels takes place?
    A. Alveoli B. Trachea C. Bronchus D. Bronchioles
14. Which of the following is correct about the effect of altitude on breathing rate? At higher altitude breathing rate
    A. increases because of the low level of oxygen in the air.
    B. decreases because of the atmospheric pressure.
    C. increases because of the high level of carbon dioxide in the air.
    D. decreases because of the high level of oxygen in the air.
15. The volume of air inhaled and exhaled is called
    A. vital capacity
    B. ventilation
    C. tidal volume
    D. oxygen debt
16. Which one of the following statements is correct about aerobic respiration? It
    A. produces lactic acid or alcohol as a byproduct.
    B. produces less ATP than anaerobic respiration.
    C. breaks down glucose into alcohol and carbon dioxide.
    D. produces more ATP than anaerobic respiration.
17. Identify the correct statement about ATP.
    A. ATP is used during diffusion.
    B. ATP is the byproduct of cellular respiration.
    C. Osmosis requires the use of ATP.
    D. ATP is the energy currency of the cell.
18. Which of the following blood components transports oxygen to all living cells in our body?
    A. White blood cells
    B. Red blood cells
    C. Platelets
    D. Plasma
19. Which one of the following statements is correct about the structure of a human heart?
    A. The contraction of right atrium sends blood out of the heart to different parts of the body
    B. When left ventricles blood flows into right atrium.
    C. When ventricles contracts forces blood to flow into atrium.
    D. The contraction of left ventricle sends blood out of the heart to different parts of the body.
20. Which one of the following blood vessels carries blood away from the heart?
    A. Arteries B. Vena cava C. Capillaries D. Veins
21. Which sub-branches of biology studies about structure of tissues?
    A. Histology B. Cytology C. Morphology D. Mycology
22. Which of the following sub-fields of biology can be grouped under applied biology?
    A. Horticulture B. Anatomy C. Taxonomy D. Embryology

23. Who discovered that the larynx produces voice?
    A. Galen B. Aristotle C. Charles Darwin D. Jane Goodall
24. Amongst the inventions listed below, which one has contributed much to the betterment of human life?
    A. Centrifuge B. Thermometer C. Microscope D. Measuring tape
25. Who pioneered research on plant physiology and propagation biology, as well as restoration mechanisms of Ethiopian/African native trees?
    A. Professor Beyene Petros C. Professor Gebissa Ejeta
    B. Professor Legesse Negash D. Professor Yalemtsehay Mekonnen
26. Gymnosperms reproductive organ is called
    A. Flower B. Spore C. Bud D. Cone
27. Most of photosynthesis takes place in the
    A. Palisade mesophyll C. Spongy mesophyll
    B. Upper epidermis D. Lower epidermis
28. The transfer of pollen between stamen and pistil of one flower or between flowers on one plant is called
    A. pollen tube formation C. self- pollination
    B. cross-pollination D. double fertilization
29. Seeds that are covered with fleshy/juicy fruits are most likely to be dispersed by
    A. animals B. water C. wind D. fire
30. The termination of the dormancy period of a seed and onset of active growth of seed-embryo is termed as
    A. germination B. pollination C. fertilization D. maturation
31. Stacks of thylakoid membrane are called
    A. stroma B. lumen C. lamella D. granum
32. Which of the following reactions does **NOT** occur during light-dependent reaction?
    A. Carbon fixation or combining carbon dioxide with water.
    B. Water molecule splits in to hydrogen and oxygen.
    C. Formation of ATP
    D. Reduction of NADP
33. If you put iodine solution on a certain type of food and a blue –black color appeared. This is an indication the food consists
    A. protein B. starch C. mineral D. lipid
34. Which of the following mechanisms enable the plant to transport water from the soil to the root and all the way up to the top of the plant?
    A. Translocation stream C. Transduction stream
    B. Transfusion stream D. Transpiration stream
35. The root is
    A. positively hydrotropic C. negatively geotropic
    B. positively phototropic D. negatively hydrotropic

36. Identify the correct statement about the properties of water.
    A. Water is a non-polar molecule.
    B. Water is an effective solvent for non-polar molecules.
    C. Water has high specific heat capacity.
    D. Water has the lowest density at 4ºC
37. Which of the following inorganic ions is the essential component of hemoglobin and myoglobin?
    A. Calcium B. Iron C. Iodine D. Sodium
38. In animals, extra glucose is stored in the form of
    A. starch B. glucagon C. glycogen D. collagen
39. In multicellular organisms growth is achieved through the process of
    A. cell division C. gamete formation
    B. cell growth D. B and C are correct
40. Which of the following sequences represent the correct change in number of chromosomes during fertilization?
    A. 2n → n C. n → 2n
    B. 2n → n + n D. n + n → 2n
41. Identify the correct combination of technology and its imitation?
    A. Photo camera-human eye C. Robotic arm- claws of animals
    B. Bullet train-cucumber fruit D. Airplane- reef shark
42. Which of the following statement best describe the benefits of biology to technology?
    A. Many biochemical substances in plants used to develop medicine.
    B. Computer tomography is a device used to take many X-ray pictures.
    C. GPS is a device used to collect information on landscape mapping.
    D. A and B are correct answers
43. Which one of the following is the negative impact of technology on society and natural environment?
    A. Improving the health conditions of humans.
    B. Ensuring food security of humans.
    C. Pesticides and fertilizers cause toxicity.
    D. Providing energy and clean water.
44. Animals having variable body temperature are called
    A. poikiliotherms C. homeotherms
    B. warm-blooded D. endothermic
45. Which of the following statements best describe characteristics of invertebrate animals?
    A. They can maintain a constant body temperature.
    B. They possess internal rigid skeletal system.
    C. They constitute small portions of all animal species known.
    D. They are the most diverse group of animals known to humans.

46. Identify the correct statement that describes the characteristics of vertebrate animals.
    A. Vertebrates have centralized nervous system.
    B. Vertebrates have endoskeleton made of bones.
    C. Vertebrates have closed circulatory system
    D. All are correct
47. Sexual reproduction differ from asexual reproduction in that:
    A. offspring are exact copies of their parents
    B. brings genetic variation
    C. involves only one parent
    D. gamete formation is not required
48. Asexual reproduction is common among
    A. vertebrate animals
    B. endothermic animals
    C. invertebrate animals
    D. warm-blooded animals
49. Parthenogenesis is a process by which
    A. individuals develop from unfertilized egg
    B. male gamete fuses with female gamete
    C. only mitosis is involved in forming the male gamete
    D. B and C are correct answers
50. Which of the following organisms carry out external fertilization?
    A. Birds and Mammals
    B. Insects and Reptiles
    C. Honey bee and House fly
    D. Frogs and Fishes
51. Identify the correct statement about complete metamorphosis.
    A. After the eggs hatched the nymph undergo a series of molting process.
    B. The larval stage is its feeding stage.
    C. It consists of three stages
    D. Grasshopper and Mayflies undergo complete metamorphosis
52. Which of the following statement is **INCORRECT** about reproduction of frogs?
    A. Frogs larval stage is called a tadpole.
    B. Tadpoles breathe using their gills.
    C. Tadpoles are exclusively aquatic.
    D. Tadpoles are similar to the adult frog.
53. Which of the following sequences show the correct order of reproduction process in birds?
    A. Mating→ Egg laying→ Incubation→ Hatching
    B. Incubation→ Mating→ Egg laying→ Hatching
    C. Egg laying→ Mating→ Hatching→ Incubation
    D. Egg laying→ Hatching→ Mating→ Incubation
54. Which of the following statement is **NOT** correct about rats?
    A. Rats are mammals
    B. They exhibit internal fertilization
    C. They have one ovary
    D. Fertilization takes place in the oviduct
55. Identify the correct statement that describes the beneficial aspects of insects.
    A. Some insects destroy crops and lead to food shortage.
    B. Some insects serve as vectors.
    C. Some insects serve as pollinators.
    D. Some insects are pests of plants, fruits, and grains in store.

56. Wildebeest populations perform an annual migration. This behavior of wildebeest can be taken as a good example of:
    A. behavioral cycle
    B. reproductive behavior
    C. social behavior
    D. competition cycle
57. The following activities like vasoconstriction and shivering helps homoeothermic animals to:
    A. lose excess heat
    B. remove extra heat
    C. generate heat
    D. retain heat
58. Which of the following statement is correct regarding blood-glucose level regulation in humans?
    A. Low blood glucose level initiates secretion of glucagon.
    B. Secretion of insulin raises blood glucose level.
    C. Insulin secretion stimulates glycogen breakdown into glucose.
    D. Glucagon stimulates glucose uptake from the blood.
59. Which one of the following mechanisms can be considered as physiological means of temperature regulation?
    A. Sweating B. Hibernation C. Clothing D. Moving into sheds
60. Which of the following is the function of helicase enzymes?
    A. It is responsible for forming new copies of DNA.
    B. It breaks down neurotransmitters.
    C. It is used to breakdown hexose sugars.
    D. It separates the intertwined DNA strands.
61. The sequences of amino acids in the polypeptide chain is
    A. secondary structure
    B. primary structure
    C. quaternary structure
    D. tertiary structure
62. The primary difference between competitive and non-competitive inhibition is that:
    A. competitive inhibition affects the substrate's ability to bind by binding an inhibitor in place of inhibitor.
    B. competitive inhibitors bind to allosteric site of the enzyme.
    C. in competitive inhibition , the inhibitors bind to the active site of the enzyme and prevent enzyme-substrate complex formation.
    D. competitive inhibition allows the substrate bind to enzyme-inhibitor complex.
63. A class of enzyme called lyases are used for:
    A. joining of two molecules.
    B. splitting bonds using water.
    C. breaking of various bonds by means other than hydrolysis.
    D. transfer of functional group from one donor to acceptor molecule.

64. Which of the following statements correctly describes factors affecting enzymatic action?
    A. Decreasing temperature below the optimum level results in denaturation of the enzyme molecule.
    B. Temperature, inhibitors, end-product and substrate concentration are some of the factors affecting enzyme action.
    C. Significant change in P^H does not have an effect on the performance of enzymes.
    D. Increasing substrate concentration beyond the optimum level increases the rate of reaction resulting in higher enzyme action.
65. In enzyme kinetics, how does increasing substrate concentration generally affect the rate of product formation and enzyme activity, assuming enzyme concentration is constant?
    A. The rate increases with substrate concentration until it reaches a maximum velocity, after which it level's off.
    B. The reaction rate decreases as substrate concentration increases due to enzyme inhibition.
    C. The rate remains constant regardless of substrate concentration.
    D. The reaction rate decreases initially and then increases as the substrate concentration increases.
66. Select the wrong combination of enzyme with its function in industries?
    A. Papain- tendering meat
    B. Rennin-cheese production
    C. Ligninase-food production
    D. Mannanase-removes stain from clothes
67. Which of the following statements is correct about malting process?
    A. Germinating stage refers to planting the grain in the soil.
    B. Kilning stage involves roasting the beans or grains until it turns brown or black.
    C. Steeping is a stage where soaking the grains or beans in water.
    D. Germination is the last stage in the process of malting.
68. Identify the **INCORRECT** statement about genetics.
    A. Chromosomes that exist in pairs are called analogous pairs.
    B. Gene is a small section of DNA that controls a specific trait.
    C. Chromosomes are thread like structure made of DNA.
    D. Some viruses use RNA as their genetic material.
69. The process of exchanging segments of genetic material between two chromosomes or bivalents during prophase I of meiosis is called
    A. cytokinesis
    B. crossing over
    C. karyokinesis
    D. duplication
70. Which of the following statements correctly describes what happens during translation stage?
    A. Unwinding of DNA strands.
    B. Conversion of the codes on mRNA into proteins.
    C. Formation of mRNA from DNA.
    D. Breakdown of proteins into amino acids.

71. Conservation of natural resources includes all, **EXCEPT**
    A. Preserving resources for future use.
    B. Wise use of natural resources
    C. Extensive use of natural resources.
    D. Protection of natural resources.
72. What are the possible consequences of deforestation of the tropical rain forest?
    A. Reduction in species diversity of an area.
    B. An increase in existing ecological niche.
    C. Increased removal of carbon dioxide from the atmosphere.
    D. An increase in the amount of nitrogen in the soil.
73. A condition in which all people have access to sufficient, safe, and nutritious food is termed as
    A. Food security B. Over nutrition C. Nutrition security D. Malnutrition
74. Identify the correct statement.
    A. Biology empowers conscious citizens
    B. Conscious citizen biologists develop innovative and cost effective bio-based technologies
    C. Biology has a vital role in creating conscious citizen
    D. All can be answer
75. The type of microorganism used in the fermentation of alcoholic drinks is_____
    A. saccharomyces B. fusarium C. archaea D. candida
76. Application of biology in biotechnology can be explained in the making of_____
    A. Dairy products B. Antibiotics C. Biosensors D. All can be answer
77. Which of the following statements is correctly describes bacterial cell?
    A. Multicellular and Eukaryotic
    B. Single celled and Prokaryotic
    C. Single celled and Eukaryotic
    D. Multicellular and Prokaryotic
78. Adapting to extreme environment is the characteristics of
    A. bacteria B. virus C. protozoa D. archaea
79. Being eukaryotic, mostly filamentous, and chemoheterotrophic in terms of nutrition is likely the characteristics of
    A. archaea B. fungi C. bacteria D. virus
80. Which of the following disease is caused by protozoa?
    A. Rabies B. Giardiasis C. Influenza D. Chicken pox
81. Identify the **INCORRECT** combination of viral structure and its function.
    A. Capsid - protein coat
    B. Envelope – surrounding nucleocapsid
    C. Plasmid – small circular DNA
    D. Core – genetic material
82. Which of the following statements is **NOT** true about normal microbiota?
    A. Colonize the host and cause disease
    B. Found in different parts of the body
    C. Also known as “normal flora”
    D. found in healthy individuals
83. Diseases like salmonellosis and botulism are transmitted from infected person to a healthy one through
    A. eating contaminated food
    B. direct contact
    C. droplet infection
    D. sexual intercourse

84. Bacteria like ***Lactobacillus, Lactococcus*** and ***Streptococcus*** play an important role in
    A. the production of insulin
    B. the recycling of minerals
    C. food production and processing
    D. methane production and processing
85. Which of the following is the most effective method of killing pathogenic microorganisms?
    A. Pasteurization
    B. Boiling
    C. Sanitization
    D. Sterilization
86. In applying bacterial isolation techniques, the final stage is
    A. taking sample
    B. characterization
    C. serial dilution
    D. purification
87. A fungal infection that affects child's scalp and hair is
    A. Tinea corporis
    B. Tinea unguim
    C. Tinea pedis
    D. Tinea capitis
88. The process of breaking down large and complex molecules through enzyme mediated reaction is termed as
    A. catabolism
    B. anabolism
    C. physical digestion
    D. churning
89. Which one of the following is the main source from which plants get nutrients necessary for their growth and development?
    A. Chlorophyll B. Light C. Atmosphere D. Soil
90. The interior of the chloroplast, called stroma is a site where:
    A. photolysis of water takes place
    B. light-independent stage of photosynthesis takes place
    C. light-dependent stage of photosynthesis takes place
    D. **$NADP^+$** is reduced to **NADPH**
91. What is the advantage of a photosystem containing molecules of different types of light-sensitive pigments? It is to:
    A. increase the size of the photosystem.
    B. increase the surface area for light absorption
    C. absorb light of different wave length
    D. increase complexity of the photosystem
92. What happens during light-dependent reaction of photosynthesis?
    A. ATP is produced and $NADP^+$ is reduced.
    B. Glucose synthesis
    C. Carbon fixation
    D. NADPH is oxidized
93. Photorespiration involves the oxidation of:
    A. glucose B. NADPH C. CAM D. RuBp
94. Which one of the following statements correctly describes the contribution of photosynthesis for the continuity of life?
    A. Photosynthesis releases additional carbon to the atmosphere.
    B. Photosynthesis provides oxygen and food for heterotrophs.
    C. Photosynthesis contributes greenhouse gases to the atmosphere.
    D. Photosynthesis absorbs oxygen from the atmosphere.

95. Cellular respiration is the process by which cells:
    A. breakdown glucose to produce ATP
    B. utilize ATP to produce glucose
    C. breakdown ADP to form AMP and P_i
    D. all are correct answers
96. Which of the following steps in cellular respiration does **NOT** require the use of oxygen?
    A. Krebs cycle B. Glycolysis C. Chemiosmosis D. Link reaction
97. Much of the ATP is produced during:
    A. Glycolysis
    B. oxidative phosphorylation
    C. link reaction
    D. Krebs cycle
98. Which of the following is **NOT** the product of Krebs cycle?
    A. Pyruvate B. CO_2 C. NADH D. ATP
99. Substrate level phosphorylation takes place in:
    A. Link reaction and electron transport
    B. Link reaction and Krebs cycle
    C. Glycolysis and Krebs cycle
    D. Glycolysis and electron transport chain
100. During alcohol fermentation, pyruvic acid in the presence of pyruvate decarboxylase is first converted to
    A. Acetaldehyde B. Lactose C. Lactic acid D. Glucose