

Time allowed: 2 hours

Instruction: Choose the best answer for the following question from the given alternatives

1. Which one of the following belongs to non-renewable natural resource?
 - A. Salt
 - B. Wind
 - C. Water
 - D. Sun
2. Food security is ensured only if
 - A. large technology is used
 - B. barrier exist to access food
 - C. garden plantation is applied
 - D. enough food is available for all
3. Which one of the following belongs to social equity in a model for sustainable development?
 - A. Preserving biodiversity
 - B. Demand satisfaction
 - C. Income quality
 - D. Viability of companies
4. Biology has a vital role in creating conscious citizen by
 - A. expanding awareness of the society
 - B. initiating citizens to negative impact
 - C. minimizing practical applications
 - D. avoiding the use of modern technology
5. The scientific study of heredity and variation of inherited characteristics is called
 - A. Genetics
 - B. Anti- aging medicine
 - C. Physiology
 - D. Caloric restriction
6. Which is the most useful change made to crops using applications of biotechnology?
 - A. Crops use more nutrients
 - B. Crops need more fertilizer
 - C. Crops resist more disease
 - D. Crops take more time to grow
7. Which area of biotechnology would most likely create ethical issues with human society?
 - A. Insulin production by bacteria
 - B. Genetic engineering to improve agriculture yields
 - C. Organ cloning for use in trans plants
 - D. DNA and forensic testing of crime scene evidence

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8. When DNA is manipulated and moved from one source to another it is known as
- A. genetic engineering
 - B. gene therapy
 - C. genetically modified organisms
 - D. electrophoresis
9. Organism that contains genes from other organisms are called.
- A. Polygenic
 - B. Transgenic
 - C. Mutagenic
 - D. Donors
10. One of the following is the example of an antibiotic.
- A. Vaccine
 - B. Penicillin
 - C. Pathogen
 - D. Antibody
11. Which of the following disease is correctly matched with its causative agent?
- A. Malaria - female anopheles mosquito.
 - B. Leishmaniasis - *Schistosoma mansoni*
 - C. Tuberculosis - *Mycobacterium leprae*
 - D. Taeniasis - *Taenia saginata*
12. Which part of a bacterial cell could be primarily attacked and destroyed by antibiotics?
- A. DNA
 - B. Cytoplasm
 - C. Cell Membrane
 - D. Cell Wall
13. One of the following is used to investigate crime by using blood, saliva and hair.
- A. Health science
 - B. Forensic science
 - C. Physical science
 - D. Ecology
14. Waste water is best described as
- A. Water that you can cook with
 - B. Water that goes down your drain or toilet
 - C. Water in a local pond
 - D. River water
15. One of the following is the use of living organism or their products for the detoxification and degradation of environmental pollutants
- A. Bioengineering
 - B. Biotransformation
 - C. Bioremediation
 - D. Biosensors

16. One of the following is the application of using living organism or their products from another living organism for the development of products that benefit humans.
- A. Biotechnology
 - B. Cell biology
 - C. Genetic engineering
 - D. Biosensors
17. The main goal of using biological warfare in modern conflict is to
- A. promote peace and cooperation.
 - B. improve public health in the affected area.
 - C. provide medical aid to the enemy.
 - D. kill the enemy using disease- causing microorganisms or their toxins.
18. Which one of the following belongs to the general characteristics of bacteria.
- A. They are multicellular organisms.
 - B. They have similar mode of nutrition.
 - C. They lack membrane bounded organelles.
 - D. Their locomotion is by pseudopodia.
19. If you saw a rod-shaped bacteria under microscopic observation, then these bacteria belongs to _____ bacteria.
- A. Cocci
 - B. Bacilli
 - C. Spirochaetes
 - D. Comma
20. Which of the following is commonly contaminated by Mucor
- A. Bread
 - B. Cereals
 - C. Meat
 - D. Rice
21. Penicillin is an antibiotic that acts upon bacteria by
- A. acting on the nucleus of bacteria.
 - B. blocking the bacterial cell wall formation.
 - C. breaking the cell membrane of the bacteria.
 - D. preventing DNA formation.

22. Which one of the following is the best reason in that treating viral infection is more difficult than bacterial infection,
- A. Viruses are smaller in size than bacteria
 - B. Viruses have no cell wall
 - C. Viruses have fewer targets for drugs.
 - D. Bacteria have peptidoglycan.
23. Which one of the following protozoan disease is more common in Ethiopia?
- A. malaria
 - B. amoebiasis
 - C. trichuriasis
 - D. trypanosomiasis
24. Which of the following is a beneficial microorganism to make bread?
- A. Bread mould
 - B. Asperigillus
 - C. Penicillium
 - D. Yeast
25. What should you do if you want to make safe an orange from mould?
- A. Buying from different market place.
 - B. Putting the orange in a warm place.
 - C. Staying the orange in a dark room.
 - D. Keeping the orange in a refrigerator.
26. Which of the following is the dark structure found at the tip of growing bread mould?
- A. Sporangium
 - B. Spores
 - C. Mycelium
 - D. Hyphae
27. Which one of the following organism is grouped under the evolutionary line of archaea.
- A. Fungi
 - B. Methanococcus
 - C. Spirochetes
 - D. Chloroflexi
28. Which of the following is correct with regard to gram negative bacteria?
- A. Have narrow periplasmic space
 - B. Have porein proteins.
 - C. Have thicker cell wall.
 - D. Gram negative results in pink color

29. Which one of the following is the correct step in gram staining?
- A. Fixation-----Iodine treatment-----Crystal violet-----Decolonization-----Staining with Safranin
 - B. Fixation-----Staining with Safranin -----Crystal violet-----Decolonization----- Iodine treatment
 - C. Fixation-----Crystal violet-----Iodine treatment-----Decolonization----- Staining with Safranin
 - D. Fixation-----Iodine treatment-----Crystal violet----- Staining with Safranin-----Decolonization
30. Syphilis is a bacterial disease caused by
- A. *Treponema pallidum*
 - B. *Salmonella typhi*
 - C. *Mycobacterium tuberculosis*
 - D. *Bordetella pertusis*
31. Which of the following are organisms that use reduced inorganic substances as their electron Sources?
- A. Lithotrophes
 - B. Organotrophes
 - C. Chemoheterotrophes
 - D. Photoautotrophes
32. Bacteria that live in very saline environment are
- A. acidophiles
 - B. psychrophiles
 - C. halophiles
 - D. thermophiles
33. Which of the following fungi belongs to Basidiomycota
- A. Mucor
 - B. Smut
 - C. Yeast
 - D. Rhizopus
34. One of the following is a harmful aspect of fungi
- A. Molds that cause deterioration of leather
 - B. Yeasts that ferment 'Tej'
 - C. *Asperigillus* species that produce oxalic acid
 - D. Mushrooms that serve as a source of food
35. Thrush is a fungal disease caused by
- A. *Trichophyton rubrum*
 - B. *Asperigillus fumigatus*
 - C. *Candida albicans*
 - D. *Microsporum canis*
36. Which one of the following protozoan category has different asexual form of reproduction from the rest
- A. Flagellates
 - B. Ciliates
 - C. Amebae
 - D. Sporozoa

37. Leishmaniasis is a disease transmitted by
- A. Sand fly
 - B. Tsetse fly
 - C. Black fly
 - D. House fly
38. Which one of the following is a characteristic of virus.
- A. Nucleic acid of a viral genome contains both DNA and RNA.
 - B. They can be grown on artificial cell free media.
 - C. They possess enzymes necessary for protein synthesis
 - D. Viruses are inert filterable agents.
39. Covid-19 is a contagious disease caused by
- A. protozoa
 - B. bacteria
 - C. virus
 - D. fungi
40. Attachment of virus to host cell is called
- A. adsorption
 - B. maturation
 - C. synthesis
 - D. penetration
41. Which of the following is true with regard to normal microbiota
- A. produce toxic compounds to other bacteria
 - B. are not found in healthy individuals.
 - C. usually affect healthy individuals.
 - D. should be avoided by taking antibiotics.
42. Cholera is a disease transmitted by
- A. sexual intercourse
 - B. drinking contaminated water
 - C. direct body contact
 - D. blood-to-blood contact
43. Which of the following terms refer to a comma shaped prokaryotic cell
- A. vibrio
 - B. coccus
 - C. spirillum
 - D. coccobacilli
44. One of the following is a type of metabolism reaction that leads to the synthesis of larger biomolecules
- A. Catabolic reactions
 - B. Anabolic reactions
 - C. Metabolic pathway
 - D. Metabolism

45. Which of the following is true of metabolism in its entirety?
- A. Metabolism depends on a constant supply of energy from food
 - B. Metabolism depends on an organism's adequate hydration
 - C. Metabolism is a property of an organism's life
 - D. Metabolism utilizes all of an organism's resources
46. Which of the steps in cellular respiration is anaerobic process?
- A. Krebs cycle
 - B. Electron transport chain
 - C. Glycolysis
 - D. Link reaction
47. In which of the following cell structure metabolism begins?
- A. Mitochondria
 - B. Nucleus
 - C. Cell Cytosol
 - D. Chloroplast
48. What are the products of Krebs cycle?
- A. Two pyruvate molecules
 - B. CO_2 , ATP, NADH, and FADH_2
 - C. Glucose and oxygen
 - D. ADP and H_2O
49. In which part of chloroplast does light dependent reaction of photosynthesis take place?
- A. Inter membrane space
 - B. Thylakoid
 - C. Stroma
 - D. On the inner membrane surface
50. The reaction in which Acetyl CoA formed is _____
- A. Link reaction
 - B. glycolysis
 - C. Lactic acid fermentation
 - D. Kreb's cycle
51. One of the following is ATP production by direct enzymatic transfer of phosphate from an intermediate substrate in catabolism to ADP.
- A. Substrate –level phosphorylation
 - B. Oxidative phosphorylation
 - C. Electron transport chain
 - D. hydrolysis
52. One of the following is the sum of chemical reactions that takes place within each cell of living organism.
- A. Cellular respiration
 - B. Catabolism
 - C. Metabolism
 - D. Anabolism

53. Where organisms get energy to do work?

- A. Solar energy
- B. Chemical energy
- C. Thermal energy
- D. Nuclear energy

54. Which of the following is true for anabolic pathway?

- A. They do not depend on enzyme
- B. They are usually spontaneous chemical reactions
- C. They consume energy to build polymers from monomers
- D. They release energy as they degrade polymers to monomers

55. One of the following is the main cellular energy molecule.

- A. ATP
- B. ADP
- C. cAMP
- D. NADH₂

56. During cellular respiration, where is energy stored in ATP?

- A. Between phosphate bonds
- B. In oxygen
- C. In sugar
- D. In nitrogenous base

57. In what step of cellular respiration glucose is broken down to Pyruvic acid?

- A. Aerobic respiration
- B. Glycolysis
- C. Electron transport chain
- D. Krebs cycle

58. How would you describe cellular respiration?

- A. Sunlight and CO₂ make ATP
- B. ATP and O₂ are used to make sugar
- C. ATP and CO₂ are used to make ADP and water
- D. Carbon- based molecules from food and oxygen are used to make ATP

59. What is the equation for aerobic cellular respiration?

- A. $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{energy}$
- B. $6CO_2 + 6H_2O \longrightarrow 6O_2 + C_6H_{12}O_6$
- C. $C_6H_{12}O_6 + 6CO_2 \longrightarrow 6O_2 + 6H_2O$
- D. $C_6H_{12}O_6 + 6H_2O \longrightarrow 6O_2 + 6CO_2$

60. In which of the following organelle does aerobic cellular respiration happen?

- A. Nucleus
- B. Mitochondria
- C. Chlorophyll
- D. Chloroplast

61. During aerobic respiration, from which process does most of the ATP molecules is produced?

- A. Krebs cycle
- B. Substrate level phosphorylation
- C. Conversion of glucose to pyruvate
- D. Chemiosmotic phosphorylation

62. Which of the following is **NOT** a stage of cellular respiration?

- A. Krebs cycle
- B. Electron transport
- C. Glycolysis
- D. Fermentation

63. Which of the following processes takes place in the cytoplasm of a cell?

- A. Glycolysis
- B. Krebs cycle
- C. Electron transport
- D. Acetyl CoA formation

64. In cellular respiration, high-energy electrons that move down the electron transport chain ultimately provide the energy needed to

- A. Transport water molecules across the membrane
- B. Convert ADP molecules in to ATP molecules
- C. Convert carbon dioxide into water molecules
- D. Break down glucose into pyruvic acid molecules

65. In which of the following lactic acid fermentation occurs?

- A. Bread dough
- B. Any environment containing oxygen
- C. Muscle cells
- D. Mitochondria

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66. What is needed from Krebs cycle for the Electron transport chain to occur?
- A. ATP
B. FADH₂
C. CO₂
D. H₂O
67. What is a product of the Electron Transport Chain?
- A. CO₂
B. C₆H₁₂O₆
C. O₂
D. H₂O
68. How many NADH molecules are produced by a molecule of glucose through Krebs cycle?
- A. Two
B. Four
C. Three
D. Six
69. Where Krebs cycles takes place?
- A. Matrix
B. Ribosome
C. Cytoplasm
D. Inter membrane space
70. Which organelle is responsible for conducting photosynthesis?
- A. Ribosome
B. Mitochondria
C. Chloroplast
D. Nucleus
71. Which one of the following is **INCORRECT** about the Calvin cycle?
- A. Produce NADP⁺
B. Produce carbon dioxide
C. Use the light reactions products
D. Produce a three carbon sugar (G3P)
72. Which of the following is a product of photosynthesis?
- A. Carbon dioxide
B. Oxygen
C. Glucose
D. Oxygen and Glucose
73. One of the following is the site in which carbon dioxide enter the leaf of a plant.
- A. Lenticels
B. Stem
C. Root
D. Stomata

74. One of the following is the function of NADP.
- A. Store electron
 - B. Carry electron and oxygen
 - C. Store energy
 - D. Carry protons and electrons
75. Where are the proteins that carry out light-dependent reaction located?
- A. Thylakoid membrane
 - B. Stroma
 - C. Thylakoid space
 - D. Cytoplasm
76. Where does the Calvin cycle occur?
- A. Lumen
 - B. Stroma
 - C. Mitochondria
 - D. Thylakoid
77. What is the function of ATP and NADPH produced during the light-dependent reactions?
- A. Give electrons to ATP synthase
 - B. Give electrons to chlorophyll
 - C. Are used to make sugar in the Calvin cycle
 - D. Combine with oxygen to make glucose
78. One of the following wavelengths of light is **NOT** absorbed by chlorophyll
- A. Red
 - B. Blue
 - C. Violet
 - D. Green
79. Electron transport chain proteins using energy from moving electrons to pump into the thylakoid space.
- A. H^+ ions
 - B. Phosphates
 - C. Glucose
 - D. Oxygen atoms
80. During the light-dependent reactions, the final electron acceptor at the end of the electron transport chain is
- A. $NADP^+$
 - B. Chlorophyll
 - C. ATP synthase
 - D. Glucose

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81. A process by which organism use light to make their food is
- A. Chlorophyll
 - B. Electron transport
 - C. Chemosynthesis
 - D. Photosynthesis
82. What is the ultimate original source of energy for living things?
- A. Carbon dioxide
 - B. Sugar
 - C. Moon
 - D. Sun
83. The process of carbon dioxide combining with RuBP is
- A. Carboxylation
 - B. Oxidation
 - C. Decarboxylation
 - D. Reduction
84. Which of the following pigment is water-soluble?
- A. Carotenoids
 - B. Fucoxanthin
 - C. Chlorophyll
 - D. Phycobilins
85. Which one is the first electron donor in non-cyclic photophosphorylation?
- A. ATP
 - B. Oxygen
 - C. NADP
 - D. Water
86. Which one is **NOT** correct about photorespiration?
- A. Produce ATP
 - B. Absent in CAM plants
 - C. Releases carbon
 - D. It is oxidation of organic compounds in the presence of light
87. Which of the metabolic processes can occur without a net influx of energy from some other process?
- A. Amino acids \longrightarrow Protein
 - B. $\text{ADP} + \text{Pi} \longrightarrow \text{ATP} + \text{H}_2\text{O}$
 - C. $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \longrightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$
 - D. $6\text{CO}_2 + 6\text{H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
88. Which of the following processes takes place during the dark reaction of photosynthesis?
- A. Photolysis of water
 - B. Production of ATP
 - C. Fixation of CO_2
 - D. Production of NADPH
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89. If Kedir take part in one hundred meter running, how do the cells generate most of the energy that is needed?
- A. Aerobic respiration in muscle cell
 - B. Alcoholic fermentation in muscle cell
 - C. Lactate fermentation in muscle cell
 - D. Oxidative phosphorylation in muscle cell
90. Under normal condition as electron flow down the electron transport chain of mitochondria, one of the following could **NOT** happen?
- A. NAD and FAD are reduced
 - B. Chemiosmosis synthesis of ATP
 - C. The electron lose free energy
 - D. Proton chemical gradient is formed
91. One of the following could happen in Calvin-Benison cycle of photosynthesis?
- A. Photolysis of water
 - B. NAD is produced
 - C. ATP is synthesis
 - D. Carbon dioxide is reduced
92. Which of the following happen in both cyclic and non-cyclic phosphorylation?
- A. Water is splitting
 - B. NADP is the last electron acceptor
 - C. Formation of ATP
 - D. Oxygen is evolved as by product
93. Which of the following does **NOT** characterize the link reaction?
- A. Decarboxylation
 - B. ATP formation
 - C. Dehydrogenation
 - D. Used for citrate production
94. Which of the following stages of the aerobic respiration responsible for production of both FADH and NADH?
- A. Glycolysis
 - B. Krebs cycle
 - C. link reaction
 - D. chemiosmosis
95. Which one is correct about theories of special creationism?
- A. The formation of life on earth due to super natural or divine forces
 - B. Life can evolve spontaneously from non-living objects.
 - C. There is no beginning and no end to life on Earth.
 - D. Life on Earth originally came from another planet

96. Recognized theory of evolution was developed by?
- A. Gregor Mendel
B. Jean Baptiste Lamark
C. Alfred Russel Wallace
D. Charles Darwin
97. Which of the following is needed for evolution by Natural selection?
- A. Respiration
B. Variation
C. Evolution
D. Selection
98. Who tries to explain how new species evolve for the first time?
- A. Darwin
B. Lamarck
C. Cuvier
D. Aristotle
99. Which of the following is the *correct* sequence of events in the origin of life?
- I. formation of protobionts
II. synthesis of organic monomers
III. synthesis of organic polymers
IV. formation of DNA-based genetic systems
- A. I, II, III, IV
B. I, III, II, IV
C. II, III, I, IV
D. IV, III, I, II
100. Which of the following pairs of structures is least likely to represent homology?
- A. The wings of a bat and the arms of a human
B. The hemoglobin of a baboon and that of a gorilla
C. The wings of a bird and those of an insect
D. The mitochondria of a plant and those of an animal