KMU-MDCAT 25 CODE: D

Total Number of MCQs: 200 **Time: 3 hours** **No Negative Marking**

BIOLOGY

1. Fasciola hepatica is a parasitic flatworm that causes fascioliasis.
   A. Ascaris infection of the small intestine.
   B. Infection with Giardia lamblia.
   C. Infection with Entamoeba histolytica.
   D. Infection with Trichomonas vaginalis.
   E. Infection with Schistosoma mansoni.

2. The Delta O cells in the Islets of Langerhans secrete:
   A. Insulin.
   B. Somatostatin.
   C. Glucagon.
   D. Pancreatic polypeptide.

3. Identify the main function of duodenum:
   A. Bile storage.
   B. Absorption of water.
   C. Digestion of food.
   D. Waste storage.

4. Which stage of the swallowing process prevents food or liquid from being aspirated to the lungs?
   A. Oral.
   B. Pharyngeal.
   C. Oesophageal.
   D. Peristalsis.

5. Which type of nephron is responsible for the development of osmotic gradients in the renal medulla?
   A. Glomerular.
   B. Cortical.
   C. Juxtamedullary.
   D. Medullary.

6. Which of the following best describes how the distal convoluted tubule contributes to regulation of blood pH in the body?
   A. Selective reabsorption of glucose.
   B. Active secretion of hydrogen ions into the filtrate.
   C. Active secretion of sodium from the glomerular filtrate.
   D. Tubular reabsorption of potassium ions.

7. The sodium potassium pumps in the distal convoluted tubule are activated by:
   A. Aldosterone.
   B. Antidiuretic hormone.
   C. Anti-natriuretic peptide.
   D. Renin.

8. If a person drinks excessive amount of water, how does the kidney respond to maintaining osmoregulation?
   A. Increase ADH release and water reabsorption.
   B. Increase aldosterone release and reabsorb more sodium.
   C. Decrease ADH release and increase water excretion.
   D. Decrease renin secretion and retain more water.

9. The primary function of glomerular capillaries is:
   A. Reabsorption of water and solutes from the renal tubules.
   B. Secretion of waste products from the blood into the tubules.

10. In a heat stroke the hypothalamus will detect an increase in core body temperature, which of the following response is triggered?
   A. Vasoconstriction and shivering.
   B. Vasodilation and sweating.
   C. Increased metabolic rate.
   D. Release of thyroxin.

11. Which nitrogenous waste has the lowest solubility in water?
   A. Urea.
   B. Ammonia.
   C. Nitrite.
   D. Nitrate.

12. By nature, human excretory system is:
   A. Amnionotelic.
   B. Uricotelic.
   C. Ureotelic.
   D. Metanotelic.

13. Hyperparathyroidism may lead to the formation of:
   A. Calcium phosphate stones.
   B. Uric acid stones.
   C. Cystine stones.
   D. Struvite stones.

14. In somatic cell hybridization, which two cells are fused to produce monoclonal antibodies?
   A. T-cells and nerve cells.
   B. Lymphocytes and spleen cells.
   C. T-cells and liver cells.
   D. B-lymphocytes and macrophages.

15. In molecular diagnostics, the primary function of DNA/RNA probes is to:
   A. Replace malfunctioning genes in affected cells.
   B. Bind to specific DNA or RNA sequences for identification.
   C. Cut genetic material at precise locations.
   D. Stimulate immune responses against disease-causing organisms.

16. A set of uniform proteins generated by genetically identical immune cells, cloned from a single original cell, are:
   A. Therapeutic proteins.
   B. Immunoglobulins.
   C. Monoclonal antibodies.
   D. Recombinant proteins.

17. Which biochemical product is used to replace an abnormal gene in a patient's cells?
   A. Antibiotic.
   B. Vaccine.
   C. Vector.
   D. Interferon.

18. In Watson and Crick's DNA model, which of the following pairs with Cytosine?
   A. Guanine.

B. Thymine.

19. Fats are considered as a very efficient source of energy because they:
A. Produce ATP directly and without requiring respiration
B. Enter into glycolysis without any modification
C. Are highly oxidized compounds
D. Generate multiple acetyl groups that produce more ATP

20. The junction between two consecutive neurons where information is transmitted from one neuron to the next is called:
A. Node-of-Ranvier
B. Synapse
C. Axon terminal
D. Dendrite cleft

21. All of the following are the functions of Golgi bodies EXCEPT:
A. Processing of protein
B. Plasma membrane formation
C. Cellular respiration
D. Lysosome formation

22. Which ion is tenfold higher in concentration outside the membrane of neuron during resting potential?
A. Potassium
B. Sodium
C. Calcium
D. Hydrogen

23. All of the following are the modes of transmission of AIDS, EXCEPT:
A. Transfusion of infected blood
B. Sharing infected needles
C. Shaking hands with infected person
D. Sexual contact with infected person

24. Which organelle of the cell is involved in the detoxification of toxins and poisonous compounds?
A. Lysosomes
B. Smooth Endoplasmic Reticulum
C. Ribosomes
D. Mitochondria

25. The active site is important in enzyme action because:
A. It binds to the substrate
B. It maintains the pH of reaction
C. It provides energy for reaction
D. It changes the shape of the enzyme

26. The idea that acquired characters are inherited is part of:
A. Darwinism
B. Neo-Darwinism
C. Lamarckism
D. Biogenesis

27. Which disease is caused by enveloped virus?
A. Flu
B. Polio
C. Hepatitis A

28. The glycoproteins are commonly found in:
A. Mitochondria
B. Chloroplasts
C. Ribosomes

29. Which structure enables the exchange of material between nucleus and cytoplasm?
A. Plasma membrane
B. Nuclear pores
C. Lysosomes
D. Mitochondria

30. The high specific heat capacity of water is due to:
A. Ionic bonding
B. Hydrogen bonding
C. Covalent bonding
D. Hydrophilic bonding

31. The contracted region of a chromosome that attaches to spindle fiber is called:
A. Telomere
B. Chromatid
C. Centromere
D. Nucleosomes

32. Touching a sharp object stimulates pain receptors. This information is carried to the central nervous system by the:
A. Motor-neuron
B. Sensory neuron
C. Associative neuron
D. Effector neuron

33. The number of chromosomes in a haploid cell are:
A. Half the chromosomes in a normal body cell
B. Double the chromosomes in a normal body cell
C. Quarter the chromosomes in a normal body cell
D. Equal to the chromosomes in a normal body cell

34. Which of the following is a branched polysaccharide found in animals:
A. Cellulose
B. Glycogen
C. Amylose
D. Chitin

35. A substance that binds to an enzyme, but NOT at the active site and reduces the enzyme activity is called:
A. Competitive inhibitor
B. Substrate
C. Non-Competitive inhibitor
D. Cofactor

36. On the basis of morphological classification, influenza virus is an example of:
A. Helical capsid virus
B. Polyhedral capsid virus
C. Enveloped capsid virus
D. Non-enveloped capsid virus

37. Which of the following is NOT a globular protein?
A. Enzyme
B. Albumin
C. Hemoglobin
D. Collagen

38. The state, when a neuron is NOT conducting an impulse during resting membrane potential is called:
A. Polarized
B. Depolarized
C. Repolarized
D. Hyperpolarized

39. Which of the following waves travel along a neuron during nerve impulse conduction?
A. Thermonuclear waves
B. Electromagnetic waves
C. Electrochemical waves
D. All of the above

40. The reticular formation in the brain runs through which specific regions?
A. Forebrain and Midbrain
B. Hindbrain and Midbrain
C. Cerebellum and Forebrain
D. Telencephalon and Cerebellum

41. Enzymes increase the rate of reaction by:
A. Increasing activation energy
B. Lowering activation energy
C. Increasing pH
D. Decreasing pH

42. A diabetic patient is advised to avoid both sucrose and lactose, because they both:
A. Are structural carbohydrates
B. Increase blood glucose after hydrolysis
C. Cannot be digested in human
D. Act as non-caloric sweeteners

43. Match the CORRECT structure of the brain with its function:
A. Medulla: Breathing
B. Pons: Memory
C. Cerebellum: Dreaming
D. Midbrain: Balance

44. Living cells Do NOT directly acquire energy released from the breakdown of food molecules because:
A. Glucose cannot be broken down inside the cells
B. Energy released is too small to be used by the cells
C. Glucose molecules do not store any energy
D. The energy released is too large, leading to heating and wastage

45. Which properties of water enable it to circulate in living bodies and act as transport medium?
A. Ionization and low density
B. Cohesion and ionization
C. Ionization and adhesion
D. Adhesion and cohesion

46. A scientist cuts the tails of mice for several generations, but their offspring are always born with tails. This rejects:
A. Darwinism
B. Neo-Darwinism
C. Lamarckism
D. Mutation theory

47. How are the phospholipid molecules arranged in the plasma membrane?
A. Hydrophilic heads face inwards and hydrophobic tails face outwards
B. Both Hydrophilic heads face each other in the membrane
C. Hydrophilic heads face outwards and hydrophobic tails face inwards
D. Hydrophilic heads and hydrophobic tails are randomly distributed

48. The structure of RNA consists of:
A. Double polynucleotide strand
B. Deoxyribose sugar
C. Five different types of nucleotides
D. Base unit instead of thymine

49. The constant diameter of DNA is maintained by:
A. Purine bases
B. Pyrimidine bases
C. Purine bases
D. Pyrimidine bases

50. Identify the CORRECT option that matches the sugar with its carbon number and functional group:
A. Glyceraldehyde - Triose, Ketone group
B. Ribose - Pentose, Aldehyde group
C. Galactose - Hexose, Ketone Group
D. Galactose - Hexose, Ketone Group

51. The CORRECT sequence of events in a reflex arc is:
A. Receptor, associative neuron, sensory neuron, motor neuron, effector
B. Receptor, motor neuron, associative neuron, sensory neuron, effector
C. Sensory neuron, receptor, motor neuron, effector
D. Motor neuron, receptor, sensory neuron, effector

52. Fertilisation normally occurs in the:
A. Uterus
B. Ovary
C. Vagina
D. Fallopian tubes

53. Which cells of the fallopian tube moisten and nourish the ovum?
A. Ciliated epithelial cells
B. Non-ciliated epithelial cells
C. Germ cells
D. Endometrial cells

54. Which of the following is NOT the accessory gland of human male reproductive system?
A. Bulbourethral gland
B. Seminal vesicle
C. Prostate gland
D. Testes

55. Syphilis is caused by what kind of bacteria:
A. Spirochaete
B. Cocci
C. Bacillus
D. Vibrio

56. What is FALSE about cartilages?

A. Cells are called chondrocytes
B. Consist of Type II collagen
C. Heal very slowly
D. Have an extensive blood supply

57. Bones provide a rigid framework with an inorganic matrix of:
A. 35%
B. 45%
C. 55%
D. 65%

58. An important feature of bone remodeling is bone breakdown. Which cell carries out this function?
A. Chondrocyte
B. Osteocyte

59. Myofibrils consist of small contractile units called _____.
A. Sarcolemma
B. Sarcoplasm
C. Sarcomere
D. Sarcoplasmic reticulum

60. Which muscle type is under conscious control and is multinucleated?
A. Smooth muscle
B. Skeletal muscle
C. Cardiac muscle
D. Ciliary muscle

61. Which part of the sarcomere contain both actin and myosin filament?
A. I-band
B. Z-line
C. A-band
D. H-zone

62. The primary role of calcium ions in muscle contraction is to:
A. Produce energy
B. Bind with troponin
C. Carry nerve impulses
D. Breakdown ATP

63. Which of the following is an example of a fibrous joint?
A. Shoulder joint
B. Elbow joint
C. Intervertebral discs
D. Skull sutures

64. Which of Mendel's laws can best explain why a child may inherit brown eyes even if one parent has blue eyes?
A. Law of Dominance
B. Law of Segregation
C. Law of Independent Assortment
D. Law of Recombination

65. What is the significance of the 9:3:3:1 ratio in a dihybrid cross?
A. It proves that all genes are linked
B. It demonstrates that traits assort independently
C. It indicates co-dominance between alleles
D. It confirms that mutations have occurred

66. In crossing over, an exchange of maternal and paternal chromatid parts occurs while homologous chromosomes are paired during _____ stage of meiosis.
A. Metaphase I
B. Prophase I
C. Anaphase II
D. Telophase I

67. Linked genes DO NOT follow Mendel's Law of Independent Assortment because:
A. They are located on different chromosomes
B. They always undergo crossing over
C. They are physically close together on the same chromosome
D. They rarely separate during meiosis

68. A carrier female for an X-linked recessive disorder:
A. Expresses the disorder fully
B. Can pass the disorder to offspring
C. Only passes the disorder to daughters
D. Cannot pass the disorder to sons

69. Which of the following is an X-linked recessive disorder in humans?
A. Cystic fibrosis
B. Thalassemia
C. Hemophilia
D. Sickle cell anemia

70. Which of the following CORRECTLY describes the expected outcome of children from a carrier mother for haemophilia (X^h) and a normal father (XY)?
A. All sons will have hemophilia
B. All daughters will be carriers
C. 50% of sons will have hemophilia, and 50% of daughters will be carriers
D. All offspring will be unaffected

71. The heart is surrounded by a tough, inelastic double membrane covering called:
A. Pleura
B. Peritoneum
C. Pericardium
D. Menings

72. Which phase of the cardiac cycle is characterized by the opening of semilunar valves?
A. Atrial systole
B. Atrial diastole
C. Ventricular systole
D. Ventricular diastole

73. Which part of the heart's conducting system delays the impulse from atria to the ventricles?
A. Sino-atrial node
B. Atrio-ventricular node
C. Purkinje fibers
D. Atrio-ventricular valves

74. The heartbeat sound "LUB" is produced on closure of:
A. Aortic valve
B. Atrio-ventricular valves
C. Pulmonary valves
D. Semilunar valves

75. What is the primary function of lymphatic vessels?
A. Transport oxygenated blood
B. Drain excess interstitial fluid
C. Produce antibodies
D. Store metabolic waste

76. The primary role of helper T-cells in immune response is:
A. Secreting perforins to destroy target cells
B. Assisting B-cells and other T-cells in their function
C. Inhibiting over activity of the immune system
D. Engulfing and digesting pathogens

77. Identify the primary characteristic of 3rd line of defense.
A. Complement system and interferons
B. Physical component of skin defense
C. Specific recognition and memory of pathogens
D. General inflammation at the site of infection

78. Which of the following best describes inspiratory reserve volume (IRV)?

79. During gaseous exchange in human respiration, the following events occur:
A. The volume of air remaining in the lungs after expiration is greater than that at the beginning.
B. The volume of air expired during normal tidal volume is less than that at the beginning.
C. The volume of air forcibly inhaled after normal tidal volume is greater than that at the beginning.
D. The volume of air forcibly exhaled after normal tidal volume is greater than that at the beginning.

80. What happens when the external intercostal muscles contract during inhalation in humans?
A. The rib cage compresses.
B. The ribs move outward.
C. The sternum moves inwards.
D. The diaphragm muscles relax.

81. The primary effect of smoking on the respiratory system:
A. Increased lung function due to presence of nicotine.
B. Reduced risk of lung cancer due to tobacco smoke.
C. Damage to alveoli reducing gaseous exchange.
D. Improves oxygenation of the blood by activating hemoglobin.

PHYSICS

82. According to Lenz's Law, the direction of induced current in a conductor is such that it:
A. Opposes the change in magnetic flux.
B. Enhances the change in magnetic flux.
C. Is perpendicular to the magnetic field.
D. Is parallel to the magnetic field.

83. In a pure capacitance AC circuit, the current:
A. Leads the voltage by 90°.
B. Leads the voltage by 45°.
C. Leads the voltage by 30°.
D. Leads the voltage by 60°.

84. In a full-wave rectifier using two diodes, the diodes:
A. Simultaneously conduct both half-cycles.
B. Are alternately switched on and off.
C. Only when both ends of transformer are positive.
D. Only in reverse bias condition.

85. The energy (E) of a quantum is given by which equation?
A. E = mc^2
B. E = hv
C. E = 1/2 mv^2
D. E = qV

86. Hydrogen spectrum, the Brackett series lines in the hydrogen atom:
A. nL = m
B. nL = m + 1
C. nL = m - 1
D. nL = m + 2

87. Which of the following statement best describes the nature of nuclear decay?
A. It occurs with spontaneous emission.
B. It occurs with electron capture.
C. It occurs with beta decay.
D. It occurs with alpha decay.

88. Another point of view: A neutron has a rest mass of 1.674×10^{-27} kg and a kinetic energy of 0.025 MeV. Calculate its speed.
A. 0.25c
B. 0.5c
C. 0.75c
D. 1.0c

89. The area under the line on a displacement-time graph of a car moving with uniform velocity would be:
A. Rectangle
B. Trapezium
C. Parallelogram
D. Parallelogram

90. A car starts from rest and moves with a uniform acceleration of $3m/s^2$. What will be its velocity after 5 seconds?
A. 8m/s
B. 12m/s
C. 15m/s
D. 18m/s

91. A passenger is standing in a stationary bus. When the bus suddenly starts moving forward, the passenger falls backward. Which phenomenon best explains this observation?
A. Friction
B. Gravity
C. Inertia
D. Deceleration

92. A ball is projected at an angle of 45° with an initial speed of 20m/s on earth. How does R_w (Range without air resistance) compare to R_a (Range with air resistance)?
A. R_w will be greater than R_a because air resistance reduces horizontal speed.

B. R_w will be equal to R_a because gravity is unchanged.
C. R_w will be lesser than R_a because air resistance reduces horizontal speed.
D. R_w will be lesser than R_a because air resistance is random.

93. A 0.02kg bullet moving at 300m/s embeds itself in a 2kg block at rest on a smooth surface. What is the velocity of the block-bullet system just after an impact?
A. 2m/s
B. 3m/s
C. 4m/s
D. 5m/s

94. Which of the following statement about projectile motion is CORRECT?
A. The horizontal velocity of a projectile changes constantly due to gravity
B. The vertical velocity of a projectile remains constant throughout the flight
C. At the highest point, the vertical velocity of the projectile is zero, but the horizontal velocity remains unchanged
D. The acceleration of the projectile is zero at the peak of its trajectory

95. The rate of doing work at any instant of time is called:
A. Work done
B. Instantaneous power
C. Average power
D. Mechanical energy

96. A 5kg body falls from the height of 30m towards the ground. All its potential energy is converted into heat on impact. What is the heat energy produced?
A. 1270J
B. 1370J
C. 1500J
D. 1570J

97. Two students, A and B, each carry a 20kg load to the top of a 10m high staircase. Student A takes 10sec, while student B takes 20sec. Which statement is CORRECT?
A. Student A does more work than student B
B. Student B does more work than student A
C. Both students do the same amount of work, but student A uses more power
D. Student A and B use the same power since they lifted the same weight

98. A wheel of radius 0.4m has an angular acceleration of 6rad/s^2. The linear acceleration is:
A. 1.2m/s^2
B. 1.2m/s^2
C. 2.4m/s^2
D. 2.4m/s^2

99. If an object is moving anticlockwise along a circular path, in a horizontal plane on a page then the direction of its angular velocity is:
A. Tangential to any point on the circle
B. Towards centre of the circle
C. Perpendicular to the plane and pointing out of the page
D. Perpendicular to the plane and pointing into the page

100. If a particle moves along a circular path of radius r with angular displacement θ (in radians), then the arc length s is given by:
A. $s = \sqrt{(r^2 + r\theta)}$
B. $s = 1/2\ r\theta$
C. $s = \theta$
D. $s = \theta/r$

101. A ball of weight F_0 is falling vertically downward through air. If the drag force acting on it at some instant is F_1, what is the F_1 (net force) on the ball?
A. $F_0 - F_1$
B. $F_0 + F_1$
C. $F_0 - F_0$
D. F_0 / F_1

102. Most liquids become:
A. Zero viscosity
B. Very low velocities
C. High velocities
D. No resistance

103. According to the equation of continuity, when the cross-sectional area of a pipe decreases, the fluid velocity:
A. Increases
B. Decreases
C. Remains the same
D. Becomes zero

104. Water flows steadily through a pipe that gradually narrows. At the wider end, the velocity of water is 1m/s. At the narrower end, the velocity is 3m/s. Which statement is CORRECT about the pressure in the narrow end compared to the wider end?
A. Pressure is lower at the narrow end because velocity is higher
B. Pressure is higher at the narrow end because velocity is higher
C. Pressure is the same at both ends since flow is continuous
D. Pressure is independent of velocity of water

105. What is the necessary condition of a wave motion?
A. The medium must be elastic
B. The medium must be inelastic
C. The particles of the medium must be independent of each other
D. The particles of the medium must not be dependent on each other

106. A progressive wave is one which:
A. Does not vibrate the medium
B. Carries energy across the medium
C. Propagates only through air
D. Requires a denser medium for propagation

107. Speed of sound in air increases with:
A. Higher temperature, higher humidity
B. Lower temperature, lower humidity
C. Higher pressure at constant temperature
D. Higher density at constant elasticity

108. A wave has velocity 300m/s and frequency 100Hz. If the medium is changed so that velocity doubles but frequency remains constant, the new wavelength will be:
A. Halved
B. Doubled
C. Same
D. Zero

109. When a particle executing simple harmonic motion moves from the mean position to the extreme position, its kinetic energy:
A. Increases continuously
B. Decreases continuously and becomes zero at the extreme position
C. Remains constant throughout the motion
D. Becomes maximum at the extreme position

110. Heat will spontaneously flow from:
A. Lower to higher internal energy only
B. High pressure to low pressure

111. The SI unit of molar specific heat is:
A. $J\ mol^{-1}\ K^{-1}$
B. $J\ mol^{-1}\ K^{-1}\ K^{-1}$
C. $J\ mol^{-1}\ K^{-1}\ K^{-1}\ K^{-1}$
D. $J\ mol^{-1}\ K^{-1}\ K^{-1}\ K^{-1}\ K^{-1}$

112. At a constant pressure (P) and volume (V), an ideal gas has C_p = 3/2R. Then C_v will be:
A. R
B. 5/2R
C. 7/2R
D. 9/2R

113. The electric field at a point is defined as:
A. Potential per unit charge
B. Work done per unit time
C. Charge per unit area
D. Force per unit positive test charge

114. Coulomb's law fits well into:
A. Newton's 1st law
B. Newton's 2nd law
C. Newton's 3rd law
D. Gauss's Law

115. The work done in moving a unit positive charge from one point to another while keeping the charge in electrostatic equilibrium is called:
A. Kinetic energy
B. Potential energy
C. Elastic potential energy
D. Potential difference

116. If the potential difference (V) across a conductor is doubled, keeping resistance (R) constant, the power dissipated (P) becomes:
A. Doubled
B. Halved
C. Four times
D. Remains unchanged

117. When the area vector A is parallel to the magnetic field B, what is the value of magnetic flux (Φ_B)?
A. BA cos θ
B. BA cos 90°
C. B/A

118. Consider the chlorination of methane to methyl chloride, the attack of chlorine free radical on methane, occurs in which phase?
A. Before initiation
B. Initiation
C. Propagation
D. Termination

119. A patient with pancreatic insufficiency shows reduced activity of an enzyme that hydrolyzes the first peptide bond at the carboxyl end of proteins and peptides, which enzyme is deficient?
A. Elastase
B. Pepsin
C. Carboxypeptidase
D. Collagenase

120. The force of attraction due to temporary dipoles is:
A. Dipole-dipole
B. Dipole-induced
C. Dipole-dipole induced
D. Dipole-induced induced

121. The Ksp value of salt $AB \rightarrow A^+ + B^-$ is 9×10^{-8}. Its molar solubility will be:
A. 3×10^{-6}
B. 9×10^{-8}
C. 3×10^{-4}
D. 9×10^{-6}

122. Water changes from a liquid at 4°C to ice at 0°C, what is the change in volume?
A. 9% increase
B. 9% decrease
C. 19% increase
D. 19% decrease

123. For an exothermic reaction, the energy level of reactant is:
A. Less than the product
B. More than the product
C. Equal to the product
D. Zero

124. Real gases DO NOT reach absolute zero in practice because:
A. Molecular collisions become inelastic due to increased kinetic energy
B. Intermolecular forces become negligible and molecules disperse
C. Kinetic energy of molecules increases due to compression
D. Intermolecular forces exceed kinetic energy of molecules

125. The energy of an orbital is determined by:
A. Hund's Rule
B. Pauli-exclusion principle
C. n+l rule
D. Boyles principle

126. The Ksp value of salt AB $\rightarrow A^+ + B^-$ is 9×10^{-8}. Its molar solubility will be:
A. 3×10^{-6}
B. 9×10^{-8}
C. 3×10^{-4}
D. 9×10^{-6}

127. Water changes from a liquid at 4°C to ice at 0°C, what is the change in volume?
A. 9% increase
B. 9% decrease
C. 19% increase
D. 19% decrease

128. (Missing or not clearly visible in provided images)

CHEMISTRY

129. In an electrolytic cell when the current passes through a solution, the anode is:
A. A positive electrode where oxidation occurs
B. A negative electrode where oxidation occurs
C. A positive electrode where reduction occurs
D. A negative electrode where reduction occurs

130. An increase in the internal energy of a chemical system can lead to all EXCEPT:
A. An increase in temperature due to rise in kinetic energy of molecules
B. A phase change such as melting or evaporation
C. A chemical reaction if energy supplied is sufficient to break bonds
D. An increase in temperature due to drop in kinetic energy of molecules

131. In the membrane, each carbon atom has three hydrogens and four carbons. Which one of the following is correct?
A. Coplanar
B. Tetrahedral
C. Linear
D. Pyramidal

132. Which of the following best explains the reaction between Beryllium (Be) and Oxygen (O)?
A. Be burns vigorously with oxygen forming a layer of BeO, which accelerates the oxidation of remaining metal
B. Be reacts with oxygen forming a layer of BeO, which protects the metal from further oxidation
C. Be reacts slowly with oxygen to form a volatile oxide BeO, which evaporates quickly
D. Be is the only alkaline earth metal that doesn't react with oxygen

133. The value of R in $atm.dm^3.mol^{-1}.K^{-1}$ is:
A. 0.0821
B. 0.821
C. 62.4
D. 8.314

134. The rate of a chemical reaction changes with:
A. Concentration of reactant molecules
B. Concentration of product molecules
C. Concentration of both reactant and product
D. Rate constant

135. According to Planck's quantum theory, if the frequency of photon is doubled, the value of hf will be:
A. Doubled
B. Increased 3 times
C. Increased 4 times
D. Unchanged

136. The specific rate constant (k) of a reaction is related to the concentration of reactants:
A. Directly
B. Inversely
C. Exponentially
D. Independently

137. An experiment shows that heating a 'protein' disrupts the alpha helix structure. Which protein structure is mainly affected?
A. Primary
B. Secondary
C. Tertiary
D. Quaternary

138. Which of the following is NOT a postulate of kinetic molecular theory of gases?
A. Gas molecules undergo elastic collision
B. Gas molecules are in continuous random motion
C. Gas molecules do not exert pressure when molecules collide with wall of container
D. Gas molecules are far away from each other

139. Spectral series for hydrogen spectrum are:
A. 2
B. 3
C. 4
D. 5

140. The most electronegative element in periodic table is:
A. F
B. Cl
C. O
D. N

141. If AH for a reaction is positive, then by decreasing temperature, the reaction will:
A. Move forward
B. Move in reverse
C. Have no effect
D. Be both forward and reverse

142. The addition of water to propene in the presence of sulfuric acid produces:
A. Propanal
B. Propan-2-ol
C. Butanol
D. Ethanol

143. In which of the following molecules does the central atom use sp^2 hybridization?
A. PH_3
B. NH_3
C. CH_4
D. SiH_4

144. In a molecule of phenol, the carbon atom which is attached to -OH group is:
A. sp hybridized
B. sp^2 hybridized
C. sp^3 hybridized
D. unhybridized

145. Which one of the following is a planar molecule?
A. NH_3
B. H_2O
C. BF_3
D. CH_4

146. Which of the following has highest bond energy?
A. HCl
B. HI
C. HF
D. HBr

147. Identify the CORRECT electronic configuration for an element with atomic number 24?

148. (Not clearly visible)

ENGLISH

165. "She studied hard," _____, she passed the exam with distinction." Choose the CORRECT transitional device:
A. however
B. for instance
C. consequently
D. in contrast

166. She completed the task with great difficulty. Identify the CORRECT usage of passive voice.
A. The task was completed with great difficulty by her.
B. The task has been completed with great difficulty by her.
C. The task has been completed with great difficulty by her.
D. The task was being completed with great difficulty by her.

167. Each of the boys _____ ambitious to lead the team.
A. have
B. has
C. is
D. are

168. "Revenge is a kind of wild justice." The sentence illustrates the use of:
A. Personification
B. Pun
C. Metaphor
D. Hyperbole

169. The old man was feeble, barely able to walk. The word "feeble" means:
A. Healthy
B. Weak
C. Strong
D. Fat

170. Which literary device involves using words or phrases that convey the opposite of their literal meaning?
A. Irony
B. Parody
C. Satire
D. Sarcasm

171. All of the players forgot _____ jerseys.
A. his
B. her
C. them
D. themselves

172. A medication dose starts at 100mg and halves each day. What will be the dose on day 4?
A. 12.5mg
B. 25mg
C. 30mg
D. 50mg

173. A library has 4 books on Shelf A, and 8 books on Shelf B. Some books are removed from Shelf B such that both shelves now have exactly the same number of books. How many books were removed from Shelf B?
(No options provided in image)

LOGICAL REASONING

174. Ahmed ranks 10th in the class of 46 students. There are only 7 students below Bilal rank wise. How many students are there between Ahmed and Bilal?
A. 27
B. 28
C. 30
D. 32

175. How is Ali related to Mustafa? If Ali says, "Mustafa's mother is the only child of my grandmother," then Mustafa's father is:
A. Brother
B. Cousin
C. Uncle
D. Father

176. A mobile company is deciding whether to collect personal user data for improving advertisement. Which of the following is a moral argument against collecting the data?
A. Users may lose trust in the company, which could hurt profits.
B. It is wrong to collect data without users' clear and informed consent.
C. Competitors already collect more data, and we need to stay competitive.
D. More data means more accurate advertising, which boosts sales.

177. A father is 5 years older than twice his son's age. If the son is 12, what is the father's age?
A. 28 years
B. 29 years
C. 30 years
D. 32 years

178. Which number comes in the missing place? 200, 180, 162, 146, 132, _____?
A. 118

B. 120
C. 122
D. 126

179. If 5 boxes of soap weigh 75 kilos and each box weighs empty weights 3 kilos, what is total weight of the soaps?
A. 15
B. 30
C. 45
D. 60

180. Consider the sequence: 64, 32, 16, 8, ... What is the 10th term of this sequence?
A. 2
B. 4
C. 1/4
D. 1/8

Khyber Medical University- MDCAT 2024 CODE: C

MCQs: 200 Time: 3.5 hours No Negative Marking

BIOLOGY

1. Catalase can be activated at pH:
   a. 1
   b. 3
   c. 5
   d. 7
2. Enzymatic activity can be inhibited by?
   a. Heavy metal ions
   b. Methane
   c. Mutase
   d. Noble gases
3. A competitive inhibitor:
   a. Accelerates the chemical reaction
   b. Competes with the enzyme
   c. Is irreversible
   d. Is reversible
4. Wings of birds and that of flying lizards provide evidence of:
   a. Convergent evolution
   b. Divergent evolution
   c. No evolution
   d. Same origin
5. The embryological stages of _____ show similarity in anatomical features.
   a. All living things
   b. All non-vertebrates
   c. All vertebrates
   d. Human, jelly fish and mouse
6. Which enzyme is secreted in the active form?
   a. Amylase
   b. Lipase
   c. Peptidase
   d. Protease
7. Which hormone stimulates the secretion of gastric juice?
   a. Cholecystokinin
   b. Gastrin
   c. Insulin
   d. Secretin
8. In an inflammatory response, bradykinin causes?
   a. Activation of natural killer cells
   b. Blockage in blood vessels
   c. Constriction of blood vessels
   d. Leakage of fluid from blood vessels
9. Which of the following is an example of passive immunity?
   a. Antibodies from mother's milk
   b. Previous chickenpox infection
   c. Inactivated polio vaccine
   d. Live polio vaccine
10. Bacteria that lack flagella are called?
    a. Amphitrichous
    b. Atrichious
    c. Lophotrichous
    d. Peritrichous
11. Antibiotics can be used against:
    a. Herpes simplex
    b. Influenza
    c. Polio
    d. Salmonella typhi
12. The _____ in semen facilitate the transport of sperms.
    a. Androgen
    b. Prostaglandins
    c. Oxytocin
    d. Testosterone
13. The acidity of urine is neutralized by?
    a. Cowpers gland
    b. Prostate gland
    c. Seminal vesicle
    d. Vas deferens
14. The corpus luteum is essentially formed from
    a. Graafian follicle
    b. Ovum
    c. Oogonium
    d. Oocyte
15. The outer layer of uterus is called as:
    a. Endometrium
    b. Myometrium
    c. Mesometrium
    d. Perimetrium
16. _____ is spread through sexual contact.
    a. Gonorrhoea
    b. Influenza
    c. Tuberculosis
    d. Typhoid
17. The cells contained in the lacunae of the bone are called
    a. Chondrocytes
    b. Osteoblast
    c. Osteocytes
    d. Osteoclast
18. The ____ surrounds the muscle fibre of the skeletal muscle.
    a. Cytoplasm
    b. Lacunae
    c. Myofibrils
    d. Sarcoplasm
19. What happens to calcium when skeletal muscles recover from contraction?
    a. Released from the sarcoplasmic reticulum
    b. Released from the myosin head
    c. Pumped into the sarcoplasmic reticulum
    d. Exchanged for sodium ions
20. Which of the following blood groups has anti-A and anti-B antibodies in the serum?
    a. A
    b. AB
    c. B
    d. O
21. What is the primary outcome of crossing over during prophase of meiosis I?
    a. Chromosomes duplicate without any exchange of parts
    b. Homologous chromosomes exchange different pairs leading to recombinant chromatids and increased genetic variation
    c. Homologous chromosomes exchange identical parts, resulting in no genetic variation
    d. Non-homologous chromosomes exchange parts
22. The genetic makeup that your parents have transferred to you for your hair color, makes up your:
    a. Genotype
    b. Karyotype
    c. Phenotype
    d. None of the above

23. Carnivorous plants have evolved mechanisms for trapping and digesting small animals. The product of this digestion is used to supplement the plant's supply of:
    a. Carbohydrates
    b. Lipids
    c. Nitrites
    d. Water
24. Which is true for an X linked dominant trait?
    a. All female offspring of the affected father will be affected
    b. Half of the female offsprings of the affected father will be affected
    c. No male offspring of an affected mother will be affected
    d. No female offspring of the affected father will be affected
25. Malpighian tubules are found in:
    a. Earthworm
    b. Grasshopper
    c. Leech
    d. Slug
26. Shark belongs to class_____
    a. Chondrichthyes
    b. Echinodermata
    c. Osteichthyes
    d. Urochordata
27. Canal system is a characteristic of?
    a. Cnidarians
    b. Protozoans
    c. Porifera
    d. Segmented worms
28. Mantle is the feature of?
    a. Annelids
    b. Chordates
    c. Echinoderms
    d. Mussel
29. The production of energy is_____.
    a. Faster in anaerobic respiration
    b. Faster in aerobic respiration
    c. Same in both types of respiration
    d. Not associated with respiration
30. The pathway to the breakdown of glucose, carried out by micro-organisms, is called:
    a. Lactic acid fermentation
    b. Alcoholic fermentation
    c. Cellular respiration
    d. None of the above
31. Chromosome is typically made up from a combination of?
    a. DNA and protein
    b. DNA and RNA
    c. RNA and lipids
    d. RNA and proteins
32. Which cytoplasmic organelle make their own proteins?
    a. Chromosomes
    b. Golgi apparatus
    c. Mitochondria
    d. Smooth endoplasmic reticulum
33. The active mass movement of mitochondria in the cytoplasm is due to
    a. Cyclosis
    b. Endoplasmic streaming movements
    c. Golgi apparatus
    d. Transfer RNA
34. Which part of the brain is controlling your sense of balance?
    a. Amygdala
    b. Cerebellum
    c. Hippocampus
    d. Medulla Oblongata
35. The neurotransmitter_____ is hydrolysed by monoamine oxidase
    a. Acetylcholine
    b. Adrenaline
    c. Gluamate
    d. Serotinin
36. Most of the neurons in the CNS are?
    a. Bipolar
    b. Multipolar
    c. Pseudo unipolar
    d. Unipolar
37. The enzymes enable the conversion of substrates into products by
    a. Changing equilibrium in the direction of the substrate
    b. Increasing the activation energy
    c. Increasing the substrate concentration
    d. Lowering the activation energy
38. According to Lamarckism, the basis of evolution is:
    a. Inheritance of acquired characteristics
    b. Mutation
    c. Natural selection
    d. Survival of the fittest
39. What best describes the hind leg bones seen in the whale?
    a. Analogous to the fin of living fish
    b. Fossil structure from an extinct ancestor
    c. Homologous structure of the wings of a bat
    d. Vestigial structures that had a function in an ancestor
40. Which is true about the cells found in gastric glands lining the stomach wall?
    a. Chief cells secrete gastrin
    b. Hormone cells secrete intrinsic factor
    c. Mucus cells secrete mucin
    d. Parietal cells secrete pepsinogen
41. What directly triggers the activation of natural killer cells?
    a. Free radicals
    b. Hydrogen peroxide
    c. Interferons
    d. Oxygen
42. Which of the following is NOT true about plasmids found in streptococci?
    a. Carry fewer genes than the chromosome
    b. Replicate autonomously from the chromosome
    c. They are considered as genetic element
    d. The bacterial chromosome depends on plasmids for replication
43. Which of the following bacteria produces endospores?
    a. Both gram negative and positive bacteria
    b. Gram negative
    c. Gram positive
    d. Mycobacteria
44. _____ is used in the production of Humulin?
    a. Bacteria
    b. Fungi
    c. Protozoa

d. Virus

45. Which of the following does NOT relate to smooth muscles?
    a. Controlled by the autonomic nervous system
    b. Have spindle shaped cells
    c. Line the wall of heart
    d. Lack striations
46. Which term best describes an organism's physical characteristic.
    a. Allele
    b. Genetic code
    c. Genotype
    d. Trait
47. What will happen with the addition of salt to water?
    a. Water potential will increase
    b. Water potential will remain same
    c. Osmotic potential will increase
    d. Osmotic potential will remain same
48. Which of the following is NOT true about viruses?
    a. Contain DNA
    b. Can replicate on their own
    c. Can infect bacteria
    d. They have a sub-cellular structure
49. The genetic code of _____ is bound by a lipid membrane?
    a. Enterovirus
    b. Flu virus
    c. Hepatitis A virus
    d. Polio virus
50. Viruses can NOT_____.
    a. Crystalise
    b. Excrete
    c. Infect bacteria
    d. Mutate
51. Where are the enzymes required for the replication of HIV virus located?
    a. In the protein spikes
    b. Surrounding the viral core
    c. Inside the capsid
    d. Outside the capsid
52. The process of ATP synthesis through a combination of electrochemical and osmotic events is known as:
    a. Fermentation
    b. Glycolysis
    c. Oxidative phosphorylation
    d. Oxidation of pyruvate to acetyl CoA
53. Optimum pH for pancreatic lipase is:
    a. 2
    b. 4
    c. 6
    d. 8
54. Sugarcane contains _____.
    a. Fructose
    b. Glucose
    c. Ribose
    d. Sucrose
55. Sickle cell anaemia results from?
    a. Reduction in oxygen carrying capacity of haemoglobin
    b. Linkage between the polypeptide chains
    c. Single amino acid substitution in the haemoglobin molecule
    d. Viral infections of RNA viruses
56. Which is INCORRECT about the globular proteins?
    a. Abundantly found in hair
    b. Are spherical in shape
    c. Have polypeptide chains
    d. Soluble in water
57. What is the ester of fatty acids and long chain alcohol called?
    a. Acylglycerol
    b. Glycerol
    c. Phospholipid
    d. Wax
58. Lipids, which do not contain fatty acid are:
    a. Neutral lipids
    b. Phosphatidic acids
    c. Steroids
    d. Waxes
59. The peptidoglycan cell wall is specific to.
    a. Amoeba
    b. Bacteria
    c. Protozoa
    d. Virus
60. Where are spindle fibres attached on a chromosome during cell division
    a. Centromere
    b. Histone proteins
    c. Nucleolus
    d. Telomere
61. Which organelle contribute towards steroid production?
    a. Endoplasmic Reticulum
    b. Golgi apparatus
    c. Lysosome
    d. Ribosomes
62. The lysosomes found in eukaryotes contain:
    a. Hydrolytic enzymes
    b. Meiotic enzymes
    c. Oxidative enzymes
    d. Mitotic enzymes
63. Plasma membrane is differentially permeable membrane due to the presence of?
    a. Carbohydrates
    b. Lipids
    c. Proteins
    d. Vitamins
64. The following function/activity is NOT controlled by the autonomic nervous system.
    a. Cardiac muscles contraction
    b. Salivation
    c. Smooth muscles contraction
    d. Thoughts and emotions
65. A motor neuron:
    a. Carries impulse from effectors to CNS
    b. Carries impulse from receptors to CNS
    c. Carries impulse from CNS to muscles
    d. Connects sensory nerves to ganglions
66. Diffusion of _____ across the post synaptic membrane causes it to depolarise:
    a. Calcium ions
    b. Chloride ions
    c. Potassium ions
    d. Sodium ions
67. A reflex action, does not involve the
    a. Brain
    b. Motor neuron
    c. Sensory neuron
    d. Spinal cord

68. What happens to the enzyme after an enzyme-catalysed reaction?
    a. Reduced to inactive form
    b. Becomes inert
    c. Changes into substrate
    d. Used for another reaction

CHEMISTRY

69. In the production of SO_3 from SO_2 and Oxygen, the yield of SO_3 is increased by
    a. Adding a catalyst
    b. Adding more SO_2
    c. Increasing temperature
    d. Removing oxygen
70. Consider $N_2 + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ $\Delta H = -92.46 kJ/mol$
    The optimum temperature (°C) to produce ammonia is
    a. 0
    b. 450
    c. 5000
    d. Constant temperature
71. The unit of K_C for the system $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ is
    a. dm^3/mol
    b. mol/ dm^3
    c. mol/ dm^6
    d. mol^2/dm^6
72. For a first order reaction A → B, the rate constant is $0.0458\ s^{-1}$. Calculate rate of the reaction if the concentration of reactant is $0.35 mol\ dm^{-3}$.
    a. $0.012\ mol\ dm^{-3}\ s^{-1}$
    b. $0.014\ mol\ dm^{-3}\ s^{-1}$
    c. $0.016\ mol\ dm^{-3}\ s^{-1}$
    d. $0.018\ mol\ dm^{-3}\ s^{-1}$
73. A reaction is first order with respect to A and second order with respect to B, the rate equation is
    a. Rate = k [A]
    b. Rate = k [A][B]
    c. Rate = k $[A]^2[B]$
    d. Rate = k $[A][B]^2$
74. What mass of aluminium oxide (Al_2O_3) is produced from 18.5g of Al metal, when it reacts completely with oxygen gas according to the following equation?
    $4Al_{(S)} + 3O_{2(g)} \rightarrow 2Al_2O_{3(S)}$
    a. 30.8g
    b. 32.6g
    c. 34.9g
    d. 36.5g
75. Calculate the work done when 1 mole of an ideal gas expands from 15 dm^3 to 20 dm^3 against a constant external pressure of 2 atmospheres.
    a. $-10\ atm.dm^3$
    b. $-5\ atm.dm^3$
    c. $5\ atm.dm^3$
    d. $10\ atm.dm^3$
76. When 1 mole of ice melts at 0°C and constant pressure of 1 atmosphere, 6025 J of heat is absorbed by the system. The molar volume of ice and water are 0.020 and 0.018 dm^3, respectively. Calculate ΔE. ($1 dm^3.atm = 101.33 J$)
    a. 6010.20J
    b. 6015.20J
    c. 6020.20J
    d. 6025.20J
77. One slice of bread with a tablespoon of peanut butter on it contains 20g carbohydrate, 10g protein, and 9g fat. Calculate total energy consumed in this intake.
    a. 158kcal
    b. 173kcal
    c. 201kcal
    d. 218kcal
78. ΔH can be measured indirectly by applying
    a. Avogadro's law
    b. Faraday's law
    c. Gas's law
    d. Hess's law
79. The heat of sublimation of potassium is 98kJ/mol, the heat of dissociation of bromine gas is 192.5 kJ/mol. The ionization energy of K is 414 kJ/mol. The electron affinity of Br is -334.7 kJ/mol and the heat of formation of KBr is -405.8 kJ/mol. Calculate the lattice energy of KBr.
    a. -679.3
    b. -669.5
    c. 669.5
    d. 679.3
80. Which one of the following is a strong electrolyte in solution?
    a. Acetic acid
    b. Ammonium hydroxide
    c. Carbonic acid
    d. Potassium iodide
81. When 4 g of magnesium was heated in excess of oxygen. Calculate the theoretical yield of magnesium oxide (MgO).
    a. 3.7g
    b. 4.2g
    c. 5.4g
    d. 6.6g
82. The electrode potential of the standard hydrogen electrode is chosen as
    a. -1 V
    b. 0 V
    c. 1 V
    d. 2 V
83. Electronegativity of Al is approximately equal to that of
    a. B
    b. Be
    c. Mg
    d. Na
84. Which of the following alkali metal forms only normal oxide with O_2?
    a. K
    b. Li
    c. Na
    d. Rb
85. Third period element that initially reacts rapidly with oxygen to form a protective oxide coating that prevents further reactions is
    a. Al
    b. Mg
    c. Na
    d. Si
86. Cu^{2+} salt solution is blue in colour due to transition of electrons from
    a. d to d orbital
    b. p to d orbital
    c. p to p orbital

d. s to p orbital

87. Potassium ferrocyanide is which type of salt?
    a. Complex
    b. Double
    c. Mixed
    d. Normal
88. Name of ketone functional group is
    a. Amino
    b. Carbonyl
    c. Carboxyl
    d. Formyl
89. Pyridine belongs to which class of organic compounds?
    a. Alicyclic
    b. Heterocyclic
    c. Homocyclic
    d. Hydrocarbon
90. Which of the following elements cannot be detected directly in a given organic compound?
    a. Chlorine
    b. Nitrogen
    c. Oxygen
    d. Phosphorous
91. The homolytic fission of C-H bond in an alkane result in
    a. Alkyl free radical
    b. Carbanion
    c. Carbocation
    d. Methylpropane
92. Addition of HBr to isobutylene mainly gives
    a. isobutyl bromide
    b. n-butyl bromide
    c. sec-butyl bromide
    d. tert-butyl bromide
93. Dehydrohalogenation of alkylhalide is carried out in presence of
    a. Alcoholic KOH
    b. Aqueous KOH
    c. Conc. H_2SO_4
    d. Zn dust
94. The pK_b of n-propyl amine is
    a. 3.24
    b. 3.28
    c. 3.32
    d. 3.35
95. The carbon atom carrying positive charge and attached to three other atoms or groups is called
    a. Carbanion
    b. Carbene
    c. Carbocation
    d. Oxonium
96. Which of the following has the highest boiling point?
    a. ethyl alcohol
    b. isopropyl alcohol
    c. n-propyl alcohol
    d. tert-butyl alcohol
97. The reaction of an alcohol with sodium produces
    a. Aldehyde
    b. Alkoxide
    c. Ethane
    d. Ethene
98. Oxidation of secondary alcohol gives
    a. Carboxylic acid
    b. Ether
    c. Ketone
    d. Phenol
99. Which aldehyde is more reactive towards nucleophilic addition?
    a. Acetaldehyde
    b. Butyraldehyde
    c. Formaldehyde
    d. Propionaldehyde
100. Acetic acid can be prepared by the hydrolysis of
    a. Ethanal
    b. Ethanol
    c. Methanoic acid
    d. Methyl cyanide
101. Protein present in haemoglobin has _____ structure.
    a. Primary
    b. Secondary
    c. Tertiary
    d. Quaternary
102. In competitive inhibition, the inhibitor
    a. Binds with substrate
    b. Competes with enzyme
    c. Competes with substrate
    d. Irreversibly binds with enzyme
103. How many moles are there in 60g of sodium hydroxide (NaOH)?
    a. 2
    b. 4
    c. 6
    d. 8
104. Heating 24.8g of copper carbonate ($CuCO_3$) in a crucible produced only 13.9g of copper oxide (CuO). What is the percentage yield of copper oxide?
    a. 81.79%
    b. 83.98%
    c. 86.87%
    d. 89.68%
105. Efficiency of chemical reaction can be checked by calculating
    a. Actual yield
    b. Theoretical yield
    c. Percentage yield
    d. Amount of the reactant unused
106. Actual yield will reach the ideal (theoretical) value if the % yield of the reaction is,
    a. 10%
    b. 50%
    c. 90%
    d. 100%
107. Which of the following sub-shell does not exist?
    a. 1p
    b. 1s
    c. 5d
    d. 6f
108. The splitting of spectral lines in magnetic field is
    a. Aufbau principle
    b. Pauli exclusion principle
    c. Stark effect
    d. Zeeman effect
109. Which element has the electronic configuration of noble-gas notation [Kr], $5s^2$, $4d^2$
    a. Mo
    b. Se
    c. Sr
    d. Zr

110. Total number of electron pairs present in the valence shell of central atom in water are
   a. 2
   b. 3
   c. 4
   d. 5

111. What is the mass of 1 mole of calcium carbonate ($CaCO_3$)?
   a. 50g
   b. 75g
   c. 100g
   d. 125g

112. Which one of the following molecules has a pyramidal structure?
   a. C_2H_4
   b. CH_4
   c. H_2O
   d. NH_3

113. Which one of the following molecules has a zero-dipole moment?
   a. BF_3
   b. NF_3
   c. NH_3
   d. H_2O

114. The unhybridized p orbital in sp^2 hybridization is
   a. In the same plane
   b. Out of the plane
   c. Parallel to sp^2 orbitals
   d. Perpendicular to sp^2 orbitals

115. 760 torr is equal to ___ Pascal
   a. 1
   b. 76
   c. 760
   d. 101325

116. How many grams of CO_2 can be produced by thermally decomposing 10 moles of $ZnCO_{3(S)}$?
   a. 320
   b. 360
   c. 400
   d. 440

117. Molar heat of vaporization of water is
   a. 40.7 cal/mol
   b. 40.7 J/mol
   c. 40.7 kcal/mol
   d. 40.7 kJ/mol

118. Distillation under very reduced pressure is ____ distillation
   a. Destructive
   b. Fractional
   c. Steam
   d. Vacuum

119. The example of metallic solid is
   a. B
   b. C
   c. Cu
   d. Si

120. When a crystalline substance conducts current in one direction but not through other directions of the crystal, this property is
   a. Allotropy
   b. Anisotropy
   c. Isomorphism
   d. Polymorphism

121. Forward reaction is the one that
   a. Is very slow at the beginning of the reaction
   b. Reacts to form reactants
   c. Speeds up gradually and at equilibrium its rate becomes constant
   d. Takes place from left to right as given in chemical equation

122. How many moles of NaCl are produced from 16.5g of HCl, according to the neutralization reaction?
$HCl_{(aq)} + NaOH_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$
   a. 0.252
   b. 0.452
   c. 0.652
   d. 0.852

PHYSICS

123. In an adiabatic process, how does the temperature of a gas change as its volume decreases?
   a. The temperature decreases
   b. The temperature increases
   c. The temperature remains constant
   d. The temperature first increases then decreases

124. During an isothermal expansion of an ideal gas, which of the following statement is true?
   a. Pressure and temperature of the gas increase
   b. The internal energy of the gas increases
   c. The temperature of the gas remains constant
   d. The work done by the gas is zero

125. Consider an ideal gas confined to the cylinder with a fixed piston, on heating the gas, all the heat supplied increases _____.
   a. Kinetic energy of the molecules
   b. Potential Energy of the molecules
   c. The intermolecular forces between gas molecules
   d. The number of gas molecules

126. What is the increase in force between two charges if the separation between them is decreased by 50 percent?
   a. Becomes four times
   b. Doubles
   c. Increases by half
   d. Triples

127. According to Coulomb's law, what happens to the electrostatic force between the 2-point charges if the distance between them is doubled?
   a. The force becomes one-fourth
   b. The force becomes half
   c. The force doubles
   d. The force remains the same

128. What does one Coulomb represent in terms of charge?
   a. The amount of charge transported by a current of one Ampere in one second
   b. The charge of one proton
   c. The charge of one electron
   d. The charge required to create a force of 1 Newton between two charges separated by 1meter

129. Two points charges, +5μC and -5μC are placed at points A and B, respectively, which are separated by a distance 2d. What is the electric potential at the midpoint M of the line joining A and B?
   a. 2kQ/d
   b. kQ/d

c. -kQ/d
d. zero

130. In the case of a parallel plate capacitor, when the distance between the two plates is reduced to half and the area of the plate doubled, the capacitance
a. Increases four times
b. Increases six times
c. Is doubled
d. Remains the same

131. If the dielectric material between the plates of the capacitor is removed, what happens to the electric field between the plates?
a. The electric field becomes zero
b. The electric field decreases
c. The electric field increases
d. The electric field remains the same

132. Capacitance of a capacitor increases with a decrease in:
a. Dielectric constant
b. Plate area
c. Permittivity
d. Plate separation

133. The I-V Graph for a non-Ohmic material is always
a. Curved
b. Horizontal
c. Linear
d. Perpendicular

134. Temperature coefficient of resistance is defined as increase in resistance per ohm original resistance per ___?
a. Degree rise in temperature
b. Unit increase in electric current
c. Unit decrease in capacitance
d. Degree drop in temperature

135. For metals, the temperature coefficient of resistance is:
a. Infinity
b. Negative
c. Positive
d. Zero

136. If R1 and R2 are respectively the filament resistance of a 100-Watt bulb and 200-Watt bulb designed to operate on the same voltage, then power of:
a. R1 is two times R2
b. R2 is two times R1
c. R2 is four times R1
d. R1 is four times R2

137. The maximum power transfer theorem states that maximum power is delivered to the load when
a. The load resistance is half of the source resistance
b. The load resistance is zero
c. The load resistance is double the source resistance
d. The load resistance is equal to the source resistance

138. Electron Volt (eV) is another unit of
a. Charge
b. Current
c. Energy
d. Power

139. An electron is moving perpendicular to the magnetic field, which of the following is correct statement about electromagnetic force acting on the electron?
a. Force acting is equal to electron charge
b. Force acting is equal to the magnetic field strength
c. Force acting is maximum
d. Zero force is acting on it

140. For a positive charged particle (q) moving with a velocity (v) in a magnetic Filed of flux density B, the force (F) acting on the charge particle is given by the expression?
a. $q = Fv \times B$
b. $F = qv \times B$
c. $F = v \times B/q$
d. $q = v \times B/F$

141. Which of the following statement is true about the magnetic field inside a solenoid?
a. It is along the axis of the coil
b. It is circular around the wires
c. It is strongest at the ends of the solenoid
d. It is zero when current flows through it

142. One-meter-long copper rod is moving with speed 20 m/sec in the magnetic field of strength 0.6 tesla what is the value of induced emf?
a. 12 V
b. 19.4 V
c. 20.6 V
d. 25 V

143. The inductance of a coil depends on.
a. Number of turns
b. Resistance of the wire used
c. Type of insulation used on the wire
d. Voltage applied to the coil

144. The direction of induced current is determined by?
a. Ampere's law
b. Faraday's law
c. Lenz's law
d. Ohm's law

145. Lenz's law is consistent with the
a. Ampere's Law
b. Faraday's law
c. Law of conservation of energy
d. Ohm's Law

146. The basic principle behind the operation of the transformer is.
a. Coulomb's law
b. Electromagnetic induction
c. Gas's Law
d. Hess's law

147. When the PN junction is reverse-biased, its reverse current is of the order of:
a. Gigaamperes
b. Kiloamperes
c. Megaamperes
d. Microamperes

148. The momentum of moving photon is:
a. mc^2
b. λ / h
c. h / λ
d. zero

149. In every instant of time, wavelength associated with a freely falling body:
a. Decreases
b. Increases two times

c. Increases four times
d. Remains constant

150. As per 2nd photoelectric experiment, photoelectric effect does not occur if the frequency of the incident light is?
a. Below the threshold frequency
b. Equals the threshold frequency
c. Three times the threshold frequency
d. Twice the threshold frequency

151. If an electron in the hydrogen atom jumps from second to first orbit, the emitted radiation has a wavelength of?
a. 4/3RH
b. 3/4RH
c. RH
d. 4RH

152. Black body is an ideal radiator that radiates _____ at all wavelengths
a. Inconsistently
b. Distinctly
c. Equally
d. Unequally

153. Mass number A refers to _____
a. Number of electrons
b. Number of nucleons
c. Number of neutrons
d. Number of protons

154. λ is a _____ constant:
a. Decay
b. Dielectric
c. Plank's
d. Proportionality

155. Gamma ray camera can observe radiations from the _____ that are concentrated in the organs
a. Atoms
b. Isotopes
c. Nucleons
d. Neutrons

156. A car is moving in a circular path at a constant speed. What provides the necessary centripetal force to keep the car moving in this path?
a. The car's inertia resisting any change in direction
b. The car's mass pulling it towards the centre of the circle
c. The engine's power pushing the car forward
d. The friction between the tyres and the road

157. Which of the following pairs correctly matches a physical quantity with its SI unit?
a. Energy- Newton
b. Force – Joule
c. Power- Watt
d. Velocity-m/s^2

158. _____ is the natural tendency of an object to remain at rest or in motion with constant velocity?
a. Friction
b. Inertia
c. Mass
d. Weight

159. A car in motion hits and gets crashed into a tree trunk, what is NOT conserved?
a. Kinetic energy alone
b. Momentum alone
c. Momentum and kinetic energy both
d. Neither kinetic energy nor momentum

160. The vertical and horizontal component of the projectile motion are
a. Correlated with each other
b. Dependent on each other
c. Independent of each other
d. Associated with each other

161. A ball is kicked horizontally from the top of a 10m high cliff with an initial speed of 15m/s. After 2 seconds, which of the following statement describes the ball's horizontal and vertical components?
a. The horizontal velocity is 15m/s while vertical velocity is 20m/s downwards
b. The horizontal velocity is 15m/s while vertical velocity is 15m/s downwards
c. The horizontal velocity is 30m/s while vertical velocity is 20m/s downwards
d. The horizontal velocity is 15m/s while vertical velocity is 0m/s

162. How does an angle between the force applied and the direction of motion influence the work done on an object?
a. Work is constant regardless of the angle
b. Work is maximum when the angle is 0^o
c. Work is negative when the angle is 90^o
d. Work is 0 when the angle is 45°

163. A nurse is pushing a wheelchair with an 80kg patient sitting on it. How much work is done by the patient's weight?
a. Half of the work
b. Maximum work
c. Minimum work
d. No work

164. If a constant force of 10N is applied to move an object 5m in the direction of the force, what is the work done?
a. 2 J
b. 5 J
c. 15 J
d. 50 J

165. The escape velocity of a body in the gravitational field of Earth is dependent on:
a. Angle on which it is thrown
b. Both mass of the body and the angle at which it is thrown
c. Mass of earth
d. Mass of the body

166. A wheel makes 3 complete revolutions. What is the total number of radians through which a point on wheel has rotated?
a. 2π
b. 3π
c. 6π
d. 9π

167. For rigid body that rotates about a fixed axis, the angle swept out by a line passing through any point on the body and intersecting the axis of rotation perpendicularly is called?
a. Angular acceleration
b. Angular displacement
c. Angular momentum
d. Angular velocity

168. In a rotating spaceship, to produce artificial gravity, what does the centripetal force do?

a. Has no effect inside the spaceship
b. Increases spaceship's rotation
c. Pulls objects towards the centre
d. Pushes the objects towards the outer wall

169. When the mass of a body moving along a circle becomes half and radius becomes double, and v is constant, the centripetal force becomes?
a. Double
b. Half
c. One-fourth
d. Remains Same

170. What happens when two waves of the same frequency and amplitude meet in phase?
a. They cancel each other out resulting in a destructive interference
b. They combine to form a wave double the amplitude, resulting in constructive interference
c. They produce a wave with zero amplitude
d. They produce a wave with the same amplitude as the individual waves

171. Which type of waves can be polarized?
a. Longitudinal waves
b. Mechanical waves
c. Sound waves
d. Transverse waves

172. For longitudinal waves_____
a. The particles of the medium oscillate perpendicular to the wave's propagation
b. The particles of the medium remain stationary as the wave passes through
c. The particles of the medium oscillate along the direction of the wave's propagation
d. Their velocity is enhanced when they travel through vacuum

173. According to the principle of superimposition, when 2 or more waves overlap at a point in space, the amplitude of the resultant wave at that point is
a. Always zero
b. The product of the individual wave amplitude
c. The product of the frequencies of the individual waves
d. The sum of the amplitudes of the individual waves

174. The speed of sound in a medium containing ideal gas is NOT dependent on
a. Density
b. Moisture
c. Pressure
d. Temperature

175. A tuning fork having angular frequency equal 440Hz produces sound waves which travel with the speed of 340 m/s. What is the separation between a compression and the adjacent rarefaction of the sound waves?
a. 0.57 m
b. 0.67 m
c. 0.77 m
d. 0.87 m

176. A police car, with its siren on, is moving towards a stationary listener. How does the stationary listener receive the frequency of the sound emitted by the siren? It
a. Decreases
b. Increases
c. Stays the same
d. Varies randomly

ENGLISH

177. Punctuate the given sentence correctly. The teacher asked did you complete your homework
a. The teacher asked, did you complete your homework?
b. The teacher asked, "Did you complete your homework?"
c. The teacher asked, "did you complete your homework".
d. The teacher asked, did you complete your homework.

178. Punctuate the following sentence correctly. Lets meet at Sarahs house after school
a. Let's meet at Sarah's house after school.
b. Let's meet at Sarahs' house after school.
c. Lets meet at Sarah's house after school.
d. Let's meet, at Sarah's house after school.

179. Do you usually take a bus.....the market?
a. By
b. For
c. Of
d. To

180. He has been working _____ this project for two weeks.
a. At
b. By
c. To
d. On

181. Identify the sentence that contains an ERROR in word order, style, or vocabulary:
a. He has a talent for solving complex problems.
b. She enjoys reading, writing, and to paint.
c. The quick brown fox jumps over the lazy dog.
d. They quickly adapted to the new environment.

182. Identify the ERROR in the sentence: The chef quickly prepared, delicious and it served a meal.
a. Punctuation
b. Style
c. Vocabulary
d. Word order

183. Order is the law of civilization as chaos is the law of the _____. The most appropriate word to be filled in is:
a. City
b. Metropolis
c. Physician
d. Wilderness

184. Blueprint is to architect as algorithm is to_____
a. Designer
b. Engineer
c. Mathematician
d. Programmer

185. "Regular exercise has been shown to improve overall health by reducing the risk of chronic diseases, such as heart disease and diabetes. Additionally, exercise enhances mental well-being by reducing stress, anxiety, and depression. Despite these benefits, many people find it challenging to maintain a consistent exercise routine due to busy schedules and a lack of motivation."

Based on the paragraph, which of the following statements can be inferred?

a. Busy schedules and lack of motivation are barriers to regular exercise.
b. Chronic diseases cannot be prevented by regular exercise.
c. Exercise is only beneficial for physical health, not mental health.
d. People who exercise regularly never experience stress or anxiety.

186. Which of the following words is a synonym for "meticulous"?

a. Abhorrent
b. Heedless
c. Incautious
d. Precise

187. A person who sells goods and services is a _____

a. Consumer
b. Purchaser
c. Patron
d. Vendor

188. The detective noticed a subtle change in the suspect's tone when he asked about her whereabouts on the night of the crime, which hinted at something more significant. What does "subtle" most likely mean?

a. Dramatic
b. Notable
c. Obvious
d. Slight

189. Despite the complicated situation, she remained _____, calmly assessing her options before deciding. Fill in the blank with the appropriate choice:

a. Composed
b. Erratic
c. Frantic
d. Hysterical

190. Find out synonym of "Elated"

a. Confused
b. Disappointed
c. Nervous
d. Overjoyed

191. Choose the sentence with the correct tense and sentence structure:

a. He is going to the market yesterday.
b. I had been waiting for the bus, and it arrives.
c. She will finish her homework before she went to bed.
d. They were playing football when it started to rain.

192. Choose the correct sentence.

a. My father was talking to his friend on mobile phone when I fall from the bicycle.
b. My father is talking to his friend on mobile phone when I fall from the bicycle.
c. My father was talking to his friend on mobile phone when I fell from the bicycle.
d. My father was talking to his friend on mobile phone when I am falling from the bicycle.

193. Choose the correct sentence:

a. She didn't knew about the surprise party.
b. She hasn't knew about the surprise party.
c. She didn't know about the surprise party.
d. She doesn't knew about the surprise party.

194. After she_____the stairs, her heart almost gave out from exhaustion.

a. Has climbed
b. Have climbed
c. Had climbed
d. Was climbing

LOGICAL REASONING

195. A store offers a 10% discount on all items. After applying the discount, the price of an item is Rs. 450. What was the original price of the item?

a. Rs. 490
b. Rs. 495
c. Rs. 500
d. Rs. 505

196. I went 10 m to the East from my house, then turned north and walked another 15m, and then I turned west and covered 12 m, and then turned south and covered 15m. How far am I from my house?

a. 0 m
b. 1 m
c. 2 m
d. 3 m

197. If a>b, b>c, and d>a then?

a. b<d
b. a<c
c. b>d
d. c>d

198. Find out the missing term in the sequence: 15, 14, 12, 9?

a. 5
b. 6
c. 7
d. 8

199. All omnivores are herbivores. No herbivores are carnivores. Some carnivores are humans. Which of the following conclusions are TRUE?
CONCLUSIONS: I. Some humans are carnivores. II. No carnivores are omnivores. III. Some omnivores are carnivores.

a. I and II
b. I and III
c. II and III
d. III

200. Read the following statements and identify the best cause-and-effect relation:

i. Sara's productivity at work has significantly decreased over the past month.
ii. Sara has been experiencing frequent interruptions due to ongoing construction work near her office.

Which of the following best describes the cause-and-effect relationship?

a. Sara's decreased productivity is causing the construction work.
b. The ongoing construction work is causing Sara's decreased productivity.
c. Sara's productivity was already decreasing before the construction work began.
d. The construction work is unrelated to Sara's productivity.