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CEE Based Model Questions (Set-D)

**CEE 200 Most Probable MCQs prepared for MBBS, BDS & BSc Nursing
Aspirants**

Instruction:

Marking Scheme: +1 mark for each correct answer and -0.25 mark for each incorrect answer.

Zoology

40 MCQs | 4 options each

Questions

1. In the Miller–Urey experiment, the electrical discharge primarily simulated which condition of early Earth?
 - A. Formation of the ozone layer
 - B. Lightning in the primitive atmosphere
 - C. Photosynthesis by early plants
 - D. Radioactive decay inside Earth

2. Which evidence most directly supports common ancestry through similarities in early embryonic development?
 - A. Similar adult body size
 - B. Similar habitats
 - C. Similar embryonic structures
 - D. Similar food preferences

3. The modern synthetic theory of evolution combines natural selection with:
 - A. Spontaneous generation alone
 - B. Genetics and population-level variation
 - C. Use and disuse of organs only
 - D. Inheritance of acquired characters only

4. Which feature is characteristic of members of phylum Echinodermata?
 - A. Jointed appendages
 - B. Water vascular system
 - C. Chitinous exoskeleton
 - D. Notochord throughout life

5. Which animal has a pseudocoelom?
 - A. Earthworm
 - B. Cockroach
 - C. Ascaris
 - D. Hydra

6. In chordates, the notochord is best described as a:

- A. Dorsal supporting rod
- B. Ventral blood vessel
- C. Digestive gland
- D. Paired excretory organ

7. Which tissue is specialized for transmitting electrical impulses?

- A. Areolar tissue
- B. Nervous tissue
- C. Adipose tissue
- D. Cartilage

8. The cells responsible for forming myelin around axons in the peripheral nervous system are:

- A. Astrocytes
- B. Microglia
- C. Schwann cells
- D. Ependymal cells

9. Which connective tissue is adapted for storing fat and providing insulation?

- A. Adipose tissue
- B. Hyaline cartilage
- C. Dense regular tissue
- D. Blood

10. The main function of ciliated epithelium in the human respiratory tract is to:

- A. Produce red blood cells
- B. Move mucus and trapped particles
- C. Secrete digestive enzymes
- D. Store calcium

11. In the life cycle of Plasmodium, sexual reproduction occurs in the:

- A. Human liver
- B. Human red blood cells
- C. Female Anopheles mosquito
- D. Human spleen

12. The infective stage of Plasmodium transmitted to humans by a mosquito is the:

- A. Merozoite
- B. Sporozoite
- C. Gametocyte
- D. Ookinete

13. In an earthworm, the principal organs for excretion and osmoregulation are:

- A. Flame cells
- B. Nephridia
- C. Malpighian tubules
- D. Green glands

14. The clitellum of an earthworm is mainly associated with:

- A. Locomotion
- B. Food digestion
- C. Reproduction and cocoon formation
- D. Blood circulation

15. In a frog, oxygen can be absorbed through the skin because it is:

- A. Dry and keratinized
- B. Thin, moist, and richly supplied with blood vessels
- C. Covered with thick scales
- D. Completely impermeable to gases

16. The functional unit of the human kidney is the:

- A. Neuron
- B. Nephron
- C. Alveolus
- D. Sarcomere

17. Which process directly creates the pressure that drives blood out of the left ventricle into the aorta?

- A. Atrial relaxation
- B. Ventricular systole
- C. Ventricular filling
- D. Closure of the semilunar valves

18. The natural pacemaker of the human heart is the:

- A. AV node
- B. Bundle of His
- C. Sinoatrial node
- D. Purkinje fibre network

19. A person with blood group AB has which feature in the ABO system?

- A. Both anti-A and anti-B antibodies in plasma
- B. Neither A nor B antigen on red cells
- C. Both A and B antigens on red cells
- D. Only A antigen on red cells

20. Most oxygen in human blood is transported:

- A. Dissolved freely in plasma
- B. Bound to haemoglobin
- C. As bicarbonate ions
- D. Bound to platelets

21. The exchange of gases between alveoli and pulmonary capillary blood occurs mainly by:

- A. Active transport
- B. Simple diffusion
- C. Osmosis
- D. Phagocytosis

22. Which part of the brainstem contains important centres regulating breathing and heart rate?

- A. Medulla oblongata
- B. Cerebellar cortex
- C. Corpus callosum
- D. Occipital lobe

23. The hormone that increases water reabsorption in the kidney collecting ducts is:

- A. Insulin
- B. ADH
- C. Thyroxine
- D. Glucagon

24. A deficiency of thyroid hormone during early childhood can severely impair:

- A. Blood clotting only
- B. Physical and mental development
- C. Bile storage only
- D. Formation of antibodies only

25. Ovulation is most directly triggered by a surge of:

- A. FSH alone
- B. LH
- C. Progesterone
- D. Prolactin

26. The acrosome of a sperm cell contains enzymes that help it:

- A. Produce antibodies
- B. Penetrate the egg coverings
- C. Store glycogen for the embryo
- D. Form the placenta

27. Which organism causes tuberculosis?

- A. Salmonella Typhi
- B. Mycobacterium tuberculosis
- C. Vibrio cholerae
- D. Candida albicans

28. Which type of immunity is produced when a person receives ready-made antibodies?

- A. Natural active immunity
- B. Artificial active immunity
- C. Passive immunity
- D. Cell-mediated memory alone

29. A vaccine containing a weakened but living pathogen is classified as:

- A. Live attenuated
- B. Toxoid
- C. Antiserum
- D. Antibiotic

30. Which blood component is most directly involved in antibody production?

- A. Erythrocytes
- B. B lymphocytes and their plasma-cell descendants
- C. Platelets
- D. Neutrophils only

31. The main purpose of tissue typing before an organ transplant is to reduce the risk of:

- A. Dehydration
- B. Immune rejection
- C. Anaemia due to iron deficiency
- D. Vitamin deficiency

32. In in-vitro fertilization, fertilization takes place:

- A. In the fallopian tube in every case
- B. Outside the body under laboratory conditions
- C. In the uterus before ovulation
- D. Inside the ovary before gamete formation

33. Which practice is most effective in reducing the transmission of waterborne intestinal pathogens?

- A. Storing untreated water in open containers
- B. Drinking adequately treated water
- C. Using antibiotics routinely
- D. Avoiding all cooked food

34. The biological control of insect pests involves:

- A. Increasing pesticide residues
- B. Using natural enemies of the pests
- C. Eliminating all decomposers
- D. Increasing soil salinity

35. A reflex action is generally characterized by a response that is:

- A. Always consciously planned
- B. Rapid and mediated through a reflex pathway
- C. Possible only during sleep
- D. Independent of the nervous system

36. Seasonal migration in many birds is primarily associated with changes in:

- A. Environmental conditions and resource availability
- B. Blood group
- C. Number of chromosomes
- D. Tooth structure

37. Which pollutant is strongly associated with acid rain formation?

- A. Oxygen
- B. Sulfur dioxide
- C. Helium
- D. Nitrogen gas

38. A species assessed as facing an extremely high risk of extinction in the wild is categorized by the IUCN as:

- A. Least Concern
- B. Near Threatened
- C. Critically Endangered
- D. Data Deficient

39. Which characteristic is an adaptation commonly found in aquatic mammals?

- A. Complete absence of lungs
- B. Streamlined body shape
- C. Permanent gill respiration
- D. No requirement for oxygen

40. Ramsar sites are internationally recognized for the conservation of:

- A. Deserts only
- B. Wetlands
- C. Volcanic mountains only
- D. Urban transport systems

Set 2: Botany

40 MCQs | 4 options each

Questions

41. Which component of an enzyme is directly responsible for recognizing and binding its substrate?
- A. Active site
 - B. Cellulose wall
 - C. Centriole
 - D. Nuclear pore
42. A plant cell placed in a highly concentrated salt solution loses water and its protoplast pulls away from the cell wall. This is:
- A. Cytokinesis
 - B. Plasmolysis
 - C. Translocation
 - D. Guttation
43. Which mineral element is a central component of the chlorophyll molecule?
- A. Iron
 - B. Magnesium
 - C. Sodium
 - D. Iodine
44. The scientific system of naming an organism with a genus name followed by a specific epithet is called:
- A. Artificial selection
 - B. Binomial nomenclature
 - C. Polyploidy
 - D. Ecological succession
45. Which group consists of prokaryotic organisms?
- A. Fungi
 - B. Plantae
 - C. Bacteria
 - D. Animalia

46. Cyanobacteria are ecologically important because many species can:

- A. Fix atmospheric nitrogen
- B. Produce seeds
- C. Form flowers
- D. Conduct pollination

47. Which statement about viruses is correct?

- A. They possess independent cellular metabolism
- B. They reproduce only inside suitable host cells
- C. All contain both DNA and RNA as their genome
- D. They are always larger than bacteria

48. The fungal group traditionally known as sac fungi is:

- A. Basidiomycetes
- B. Ascomycetes
- C. Bryophytes
- D. Chlorophytes

49. Lichens are commonly described as a close association between a fungus and:

- A. A flowering plant root
- B. An alga or cyanobacterium
- C. An insect larva
- D. A moss capsule only

50. Which pigment gives many red algae their characteristic colour and helps them absorb light at depth?

- A. Phycoerythrin
- B. Melanin
- C. Haemoglobin
- D. Xanthophyll alone

51. The dominant, independent plant body in bryophytes is the:

- A. Sporophyte
- B. Gametophyte
- C. Seed
- D. Embryo sac

52. In ferns, the sporangia are commonly borne on structures called:

- A. Sori
- B. Cotyledons
- C. Anthers
- D. Stomata

53. Which feature distinguishes gymnosperms from angiosperms?

- A. They have vascular tissue
- B. They produce pollen
- C. Their seeds are not enclosed within a fruit
- D. They carry out photosynthesis

54. In Pinus, the male gametophyte is represented by the:

- A. Pollen grain
- B. Ovule
- C. Seed coat
- D. Megaspore mother cell

55. Which floral part develops into the fruit after fertilization in a typical angiosperm?

- A. Anther
- B. Ovary
- C. Stigma
- D. Petal

56. A flower with fused petals is described as:

- A. Polypetalous
- B. Gamopetalous
- C. Apetalous
- D. Polysepalous

57. Which family includes pea, bean, and many plants with a papilionaceous corolla?

- A. Fabaceae
- B. Brassicaceae
- C. Liliaceae
- D. Solanaceae

58. Which of the following is a characteristic feature of the family Solanaceae?

- A. Flowers always lack a corolla
- B. Stamens are typically five and epipetalous
- C. Ovary is always inferior
- D. Seeds are enclosed in naked cones

59. Neem is scientifically known as:

- A. Ocimum sanctum
- B. Azadirachta indica
- C. Rauwolfia serpentina
- D. Zingiber officinale

60. Which medicinal plant is associated with the alkaloid reserpine?

- A. Tulasi
- B. Sarpagandha
- C. Ginger
- D. Neem

61. In a pond ecosystem, phytoplankton generally occupy which trophic level?

- A. Primary producers
- B. Primary consumers
- C. Secondary consumers
- D. Decomposers only

62. In the nitrogen cycle, conversion of atmospheric nitrogen into biologically usable nitrogen compounds is called:

- A. Denitrification
- B. Nitrogen fixation
- C. Transpiration
- D. Fermentation

63. Which gas is the principal contributor to the enhanced greenhouse effect from human fossil-fuel combustion?

- A. Carbon dioxide
- B. Neon
- C. Hydrogen
- D. Argon

64. Ecological succession beginning in an area without previously developed soil is called:

- A. Secondary succession
- B. Primary succession
- C. Seasonal migration
- D. Artificial hybridization

65. A plant adapted to dry habitats is termed a:

- A. Hydrophyte
- B. Xerophyte
- C. Mesophyte
- D. Halophyte in every case

66. Which organelle is the principal site of aerobic respiration in eukaryotic cells?

- A. Golgi apparatus
- B. Mitochondrion
- C. Chloroplast
- D. Lysosome

67. The fluid-mosaic model describes the structure of the:

- A. Cell membrane
- B. Cellulose cell wall only
- C. Chromosome
- D. Nucleolus

68. Which organelle modifies, sorts, and packages many proteins for transport?

- A. Golgi apparatus
- B. Ribosome alone
- C. Centromere
- D. Vacuolar membrane only

69. During which phase of mitosis do chromosomes align at the equatorial plate?

- A. Prophase
- B. Metaphase
- C. Anaphase
- D. Telophase

70. Crossing over normally occurs during which stage of meiosis?

- A. Leptotene of prophase I
- B. Pachytene of prophase I
- C. Metaphase II
- D. Telophase II

71. The enzyme that synthesizes a new DNA strand during DNA replication is:

- A. DNA polymerase
- B. Lipase
- C. Pepsin
- D. Amylase

72. In the central dogma of molecular biology, information is ordinarily transferred from:

- A. Protein to DNA
- B. DNA to RNA to protein
- C. Lipid to RNA to DNA
- D. Carbohydrate to protein to DNA

73. If an organism has genotype Aa and the alleles show complete dominance, which phenotype is expected?

- A. Recessive phenotype only
- B. Dominant phenotype
- C. Both phenotypes must appear equally
- D. No phenotype is expressed

74. When both alleles are fully expressed in a heterozygote, the inheritance pattern is:

- A. Complete dominance
- B. Codominance
- C. Lethal inheritance
- D. Incomplete penetrance by definition

75. Down syndrome is most commonly associated with:

- A. Monosomy X
- B. Trisomy 21
- C. Trisomy 18
- D. XXY sex chromosomes

76. The plant tissue responsible for most upward transport of water and mineral salts is:

- A. Phloem
- B. Xylem
- C. Epidermis
- D. Cork

77. The main driving force for the ascent of sap in tall plants is generally explained by:

- A. Cohesion-tension generated by transpiration
- B. Gravity pulling water upward
- C. Active pumping by every xylem vessel
- D. Diffusion of sugars from leaves into roots

78. The Calvin–Benson cycle occurs in the:

- A. Thylakoid lumen
- B. Chloroplast stroma
- C. Mitochondrial matrix
- D. Cytosol only

79. Which plant hormone is most closely associated with cell elongation and apical dominance?

- A. Auxin
- B. Ethylene only
- C. Absciscic acid only
- D. Jasmonic acid only

80. The production of a whole plant from a small piece of plant tissue under sterile culture conditions demonstrates:

- A. Biomagnification
- B. Totipotency
- C. Denitrification
- D. Transpiration pull

Chemistry

50 MCQs | 4 options each

Questions

81. The number of moles in 9 g of water is approximately:

- A. 0.25 mol
- B. 0.50 mol
- C. 1.00 mol
- D. 2.00 mol

82. Which pair represents isotopes of the same element?

- A. ${}^{11}_{23}\mathrm{Na}$ and ${}^{12}_{24}\mathrm{Mg}$
- B. ${}^{17}_{35}\mathrm{Cl}$ and ${}^{17}_{37}\mathrm{Cl}$
- C. ${}^{6}_{14}\mathrm{C}$ and ${}^{7}_{14}\mathrm{N}$
- D. ${}^{18}_{40}\mathrm{Ar}$ and ${}^{20}_{40}\mathrm{Ca}$

83. The maximum number of electrons that can occupy the third principal energy level is:

- A. 8
- B. 18
- C. 32
- D. 9

84. Which quantum number specifies the orientation of an orbital in space?

- A. Principal quantum number, n
- B. Azimuthal quantum number, l
- C. Magnetic quantum number, m_l
- D. Spin quantum number, m_s

85. Which element has the highest electronegativity?

- A. Oxygen
- B. Chlorine
- C. Fluorine
- D. Nitrogen

86. The molecular shape of ammonia, NH_3 , is:

- A. Trigonal planar
- B. Trigonal pyramidal
- C. Tetrahedral with four bonded atoms
- D. Linear

87. The hybridization of the carbon atom in ethyne, $\text{HC}\equiv\text{CH}$, is:

- A. sp
- B. sp^2
- C. sp^3
- D. dsp^2

88. Which molecule has a permanent dipole moment?

- A. CO_2
- B. BF_3
- C. CCl_4
- D. H_2O

89. The strongest intermolecular attraction between ordinary water molecules is:

- A. Metallic bonding
- B. Hydrogen bonding
- C. Ionic bonding between all molecules
- D. Covalent bonding between separate molecules

90. In the reaction $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$, magnesium is:

- A. Reduced
- B. Oxidized
- C. Neither oxidized nor reduced
- D. Acting as a catalyst

91. How many molecules are present in 0.5 mol of a substance?

- A. 3.011×10^{23}
- B. 6.022×10^{23}
- C. 1.204×10^{24}
- D. 6.022×10^{22}

92. At constant temperature and pressure, equal volumes of ideal gases contain equal numbers of molecules when they have the same:
- A. Molar mass
 - B. Density
 - C. Volume only, regardless of temperature
 - D. Temperature and pressure
93. Which gas law states that the pressure of a fixed amount of gas is inversely proportional to its volume at constant temperature?
- A. Charles' law
 - B. Boyle's law
 - C. Avogadro's law
 - D. Dalton's law of partial pressures
94. For a reaction at equilibrium, the value of the equilibrium constant changes when the:
- A. Concentration is changed at constant temperature
 - B. Catalyst is added
 - C. Temperature is changed
 - D. Pressure is changed at constant temperature
95. For an exothermic equilibrium reaction, increasing temperature generally shifts equilibrium toward the:
- A. Products
 - B. Reactants
 - C. Side with more catalyst
 - D. Side with the larger molecules only
96. A solution contains 0.2 mol of solute in 500 mL of solution. Its molarity is:
- A. 0.1 M
 - B. 0.2 M
 - C. 0.4 M
 - D. 2.5 M
97. The pH of a 10^{-5} M strong acid solution at 25°C , assuming ideal dilute behaviour, is approximately:
- A. 2
 - B. 5
 - C. 7
 - D. 9

98. Which solution is expected to have a pH greater than 7 at 25°C?

- A. 0.1 M HCl
- B. 0.1 M NaOH
- C. 0.1 M HNO_3
- D. Pure water with no dissolved substances

99. A buffer solution resists changes in pH because it contains:

- A. Only a strong acid
- B. A weak acid and its conjugate base, or a weak base and its conjugate acid
- C. Only pure water
- D. An insoluble metal and no ions

100. The half-life of a first-order reaction is:

- A. Directly proportional to initial concentration
- B. Independent of initial concentration
- C. Always zero
- D. Inversely proportional to the square of the rate constant

101. A catalyst increases the reaction rate mainly by:

- A. Increasing the enthalpy of reactants
- B. Lowering the activation energy pathway
- C. Changing the equilibrium constant at fixed temperature
- D. Increasing the amount of product allowed at equilibrium

102. In a galvanic cell, oxidation occurs at the:

- A. Cathode
- B. Anode
- C. Salt bridge only
- D. External voltmeter

103. During electrolysis, the quantity of substance deposited at an electrode is proportional to the total electric charge passed, provided other relevant conditions are fixed. This is associated with:

- A. Faraday's law of electrolysis
- B. Boyle's law
- C. Hess's law
- D. Raoult's law only

104. Which thermodynamic quantity is a measure of the dispersal of energy in a system?

- A. Entropy
- B. Molarity
- C. Atomic number
- D. Activation energy

105. A reaction is spontaneous at constant temperature and pressure when its Gibbs free-energy change is:

- A. Positive
- B. Negative
- C. Always zero
- D. Equal to the activation energy

106. Which isotope is commonly used in radiocarbon dating of once-living material?

- A. Carbon-12
- B. Carbon-13
- C. Carbon-14
- D. Oxygen-18

107. Which substance is commonly used as a primary standard in acid–base titration because of its high purity and stability?

- A. Sodium hydroxide pellets exposed to air
- B. Anhydrous sodium carbonate
- C. Concentrated hydrochloric acid
- D. A freshly prepared unknown solution

108. The oxidation number of sulfur in H_2SO_4 is:

- A. +2
- B. +4
- C. +6
- D. –2

109. Which oxide is amphoteric?

- A. Na_2O
- B. CO_2
- C. Al_2O_3
- D. SO_3

110. Which gas turns moist blue litmus paper red and is associated with acidic properties in water?

- A. Ammonia
- B. Hydrogen chloride
- C. Oxygen
- D. Nitrogen

111. The major constituent of natural gas is usually:

- A. Methane
- B. Ethyne
- C. Benzene
- D. Carbon disulfide

112. Which allotrope of carbon conducts electricity effectively because of delocalized electrons?

- A. Diamond
- B. Graphite
- C. Amorphous sulfur
- D. White phosphorus

113. The principal ore of aluminium is:

- A. Haematite
- B. Bauxite
- C. Galena
- D. Cinnabar

114. In metallurgy, a flux is added mainly to:

- A. Convert every metal into a gas
- B. React with gangue to form slag
- C. Increase the mass of the ore without reaction
- D. Stop all oxidation reactions

115. Stainless steel resists corrosion primarily because chromium forms a:

- A. Thick, soluble salt layer
- B. Thin, protective oxide film
- C. Layer of liquid mercury
- D. Permanent coating of carbon dioxide

116. Which ion is central to the oxygen-carrying function of haemoglobin?

- A. Na^+
- B. Fe^{2+}
- C. Zn^{2+}
- D. Ca^{2+}

117. Which metal ion is essential for the structure and catalytic function of many enzymes and is also involved in immune function?

- A. Zinc
- B. Lead
- C. Mercury
- D. Cadmium

118. The toxicity of lead is especially concerning because it can damage the:

- A. Nervous system and blood-forming processes
- B. Cellulose cell wall of plants only
- C. Ozone layer directly
- D. Nitrogen molecule

119. Which functional group is present in aldehydes?

- A. $-\text{COOH}-\text{COOH}-\text{COOH}$
- B. $-\text{CHO}-\text{CHO}-\text{CHO}$
- C. $-\text{OH}-\text{OH}-\text{OH}$ only
- D. $-\text{NH}_2-\text{NH}_2-\text{NH}_2$ only

120. The IUPAC name of $\text{CH}_3\text{CH}_2\text{CH}_2\text{OHCH}_2\text{CH}_2\text{CH}_2\text{OHCH}_3$ is:

- A. Propan-1-ol
- B. Propan-2-ol
- C. Ethanol
- D. Butan-1-ol

121. Which pair consists of functional isomers?

- A. Ethanol and dimethyl ether
- B. Propane and propene
- C. Ethane and ethyne
- D. Methane and methanol

122. A nucleophile is a species that typically:

- A. Accepts an electron pair
- B. Donates an electron pair
- C. Always contains no electrons
- D. Must be a neutral metal atom

123. Which reaction is a typical example of electrophilic addition?

- A. Addition of HBr to ethene
- B. Substitution of methane by chlorine under light
- C. Oxidation of ethanol to ethanoic acid
- D. Ester hydrolysis

124. Which reagent can be used to distinguish an aldehyde from most ketones?

- A. Tollens' reagent
- B. Sodium chloride solution
- C. Pure water
- D. Dilute sodium sulfate

125. Esterification commonly occurs between:

- A. An alcohol and a carboxylic acid
- B. An alkane and an alkali metal only
- C. Two noble gases
- D. A salt and a noble gas

126. Which polymer is formed from amino acid monomers?

- A. Polyethylene
- B. Protein
- C. Polyvinyl chloride
- D. Polystyrene

127. Saponification is the alkaline hydrolysis of:

- A. Fats or oils to produce soap and glycerol
- B. Alkanes to produce noble gases
- C. Water to produce salt
- D. Alcohols to produce oxygen only

128. Which method is particularly suitable for separating coloured components of a mixture based on different affinities for stationary and mobile phases?

- A. Chromatography
- B. Simple sieving only
- C. Magnetic separation only
- D. Decantation of immiscible solids only

129. In a titration, the equivalence point is reached when:

- A. The indicator first enters the flask
- B. The reacting substances have combined in stoichiometric proportions
- C. The solution becomes colourless in every titration
- D. The burette is completely empty regardless of the reaction

130. Which method is most appropriate for determining the concentration of a known acid using a standard base?

- A. Acid–base titration
- B. Paper chromatography only
- C. Sublimation
- D. Filtration alone

Physics

50 MCQs | 4 options each

Questions

131. A car travels 150 m in 10 s at a constant speed. Its speed is:

- A. 10 m/s
- B. 15 m/s
- C. 20 m/s
- D. 1500 m/s

132. The slope of a velocity–time graph represents:

- A. Displacement
- B. Acceleration
- C. Momentum
- D. Power

133. A body moving at constant speed in a circle has acceleration because:

- A. Its speed must increase continuously
- B. Its direction of velocity changes
- C. Its mass changes
- D. Gravity becomes zero

134. A 4 kg object accelerates at 3 m/s^2 . The net force on it is:

- A. 1.33 N
- B. 7 N
- C. 12 N
- D. 24 N

135. A 2 kg object is lifted vertically by 5 m. Taking $g=10 \text{ m/s}^2$, the increase in gravitational potential energy is:

- A. 10 J
- B. 25 J
- C. 50 J
- D. 100 J

136. The kinetic energy of a body moving with speed v is proportional to:

- A. v
- B. v^2
- C. $1/v$
- D. $1/v^2$

137. A machine performs 600 J of work in 20 s. Its average power is:

- A. 12 W
- B. 20 W
- C. 30 W
- D. 120 W

138. The principle of conservation of linear momentum applies to a system when the net external force is:

- A. Maximum
- B. Zero
- C. Equal to its weight
- D. Always upward

139. The moment of a force about a pivot depends on the force and its:

- A. Temperature
- B. Perpendicular distance from the pivot
- C. Electrical resistance
- D. Density only

140. A hydraulic lift works according to:

- A. Pascal's principle
- B. Snell's law
- C. Faraday's law
- D. Doppler's principle

141. The SI unit of specific heat capacity is:

- A. $\text{J kg}^{-1} \text{K}^{-1}$
- B. J K^{-1}
- C. W m^{-1}
- D. kg m s^{-1}

142. Heat transfer through a metal rod from its hot end to its cold end mainly occurs by:

- A. Conduction
- B. Convection only
- C. Evaporation
- D. Nuclear fusion

143. During the melting of pure ice at its melting point, the supplied heat primarily increases the:

- A. Temperature of the ice continuously
- B. Potential energy associated with the phase change
- C. Mass of the ice
- D. Gravitational acceleration

144. For an ideal gas at constant volume, increasing its absolute temperature causes its pressure to:

- A. Decrease in inverse proportion
- B. Increase in direct proportion
- C. Remain constant under all conditions
- D. Become zero

145. The first law of thermodynamics expresses conservation of:

- A. Electric charge only
- B. Energy
- C. Angular momentum only
- D. Atomic number

146. The efficiency of a heat engine is the ratio of:

- A. Heat rejected to heat absorbed
- B. Useful work output to heat absorbed
- C. Heat absorbed to work output
- D. Work output to total mass

147. Sound waves in air are primarily:

- A. Transverse electromagnetic waves
- B. Longitudinal mechanical waves
- C. Matter waves
- D. Stationary electric fields

148. If the frequency of a wave doubles while its speed remains constant, its wavelength becomes:

- A. Twice as large
- B. Half as large
- C. Four times as large
- D. Unchanged

149. The apparent change in frequency of a sound due to relative motion between source and observer is called the:

- A. Photoelectric effect
- B. Doppler effect
- C. Compton effect
- D. Hall effect

150. Resonance occurs when the driving frequency matches the system's:

- A. Zero frequency
- B. Natural frequency
- C. Average temperature
- D. Electrical charge

151. The refractive index of a medium is defined as the ratio of the speed of light in:

- A. The medium to vacuum
- B. Vacuum to the medium
- C. Air to glass density
- D. Glass to water density

152. When light travels from glass into air at an angle greater than the critical angle, it undergoes:

- A. Diffraction only
- B. Total internal reflection
- C. Polarization by absorption only
- D. Nuclear scattering

153. A convex lens forms a real image of an object placed beyond its focal point. The image can be projected onto a screen because it is:

- A. Virtual
- B. Real
- C. Always upright
- D. Located at infinity in every case

154. In Young's double-slit experiment, fringe spacing increases when the:

- A. Wavelength decreases
- B. Distance to the screen increases
- C. Slit separation increases
- D. Light speed in vacuum decreases

155. The phenomenon that demonstrates the wave nature of light particularly clearly is:

- A. Diffraction
- B. Radioactive decay
- C. Nuclear fission
- D. Thermionic emission

156. The electric field at a point is defined as force per unit:

- A. Mass
- B. Positive test charge
- C. Time
- D. Resistance

157. Two point charges of the same sign placed near each other will:

- A. Attract
- B. Repel
- C. Always become neutral
- D. Produce no electric field

158. The SI unit of electric potential difference is:

- A. Coulomb
- B. Volt
- C. Tesla
- D. Farad

159. A capacitor stores energy primarily in its:

- A. Magnetic poles
- B. Electric field
- C. Mechanical bearings
- D. Nuclear core

160. If the plate separation of a parallel-plate capacitor is doubled while the plate area and dielectric remain unchanged, its capacitance becomes:

- A. Double
- B. Half
- C. Four times
- D. Unchanged

161. A current of 3 A flows through a resistor of 4 Ω . The potential difference across it is:

- A. 0.75 V
- B. 7 V
- C. 12 V
- D. 16 V

162. Two resistors of 6 Ω each are connected in parallel. Their equivalent resistance is:

- A. 3 Ω
- B. 6 Ω
- C. 12 Ω
- D. 36 Ω

163. Electrical power dissipated by a resistor carrying current I with resistance R is:

- A. $IRIR$
- B. I^2R
- C. $R/I^2R/I^2$
- D. $I/R/I/R$

164. The drift of charge carriers in a metallic conductor under an applied electric field produces:

- A. Electric current
- B. Gravitational waves
- C. Nuclear fission
- D. Sound without energy transfer

165. The magnetic force on a moving charged particle is zero when its velocity is:

- A. Perpendicular to the magnetic field
- B. Parallel or antiparallel to the magnetic field
- C. At 45° to the field only
- D. Always nonzero

166. The SI unit of magnetic flux density is:

- A. Weber
- B. Tesla
- C. Henry
- D. Ohm

167. According to Faraday's law, an induced emf is produced when there is a change in:

- A. Magnetic flux linked with a circuit
- B. The mass of the conductor only
- C. The colour of the conductor
- D. The gravitational constant

168. A transformer operates on the principle of:

- A. Mutual electromagnetic induction
- B. Chemical decomposition
- C. Photoelectric emission
- D. Static friction

169. A transformer has 500 turns in the primary and 100 turns in the secondary. If the primary voltage is 220 V, the ideal secondary voltage is:

- A. 22 V
- B. 44 V
- C. 110 V
- D. 440 V

170. The energy of a photon is directly proportional to its:

- A. Wavelength
- B. Frequency
- C. Period squared
- D. Speed squared in vacuum

171. The photoelectric effect supports the idea that light energy is transferred in:

- A. Continuous packets of any size only
- B. Discrete quanta called photons
- C. Sound waves
- D. Neutrons only

172. The de Broglie wavelength of a particle is inversely proportional to its:

- A. Momentum
- B. Electric charge alone
- C. Temperature alone
- D. Volume

173. An alpha particle is:

- A. An electron
- B. A helium nucleus
- C. A photon
- D. A neutron alone

174. In beta-minus decay, a neutron in the nucleus transforms into a:

- A. Proton, electron, and antineutrino
- B. Proton and positron only
- C. Pair of photons only
- D. Helium nucleus

175. The half-life of a radioactive isotope is the time required for the number of undecayed nuclei to fall to:

- A. One-quarter of the original number
- B. Half of the original number
- C. Zero in all cases
- D. Twice the original number

176. Nuclear fission involves:

- A. Joining light nuclei into a heavier nucleus
- B. Splitting a heavy nucleus into lighter nuclei
- C. Removing electrons from an atom only
- D. Converting sound into heat

177. In a semiconductor, doping is used mainly to:

- A. Control its electrical conductivity
- B. Eliminate all charge carriers
- C. Convert it into a perfect insulator
- D. Increase its nuclear binding energy

178. A p-type semiconductor is formed by doping pure silicon with an impurity that has:

- A. Five valence electrons
- B. Three valence electrons
- C. Eight valence electrons
- D. No valence electrons

179. Which particle mediates the electromagnetic interaction in the Standard Model?

- A. Gluon
- B. Photon
- C. Higgs boson
- D. Neutrino

180. The Sun's energy is produced mainly by:

- A. Chemical combustion of coal
- B. Nuclear fusion of hydrogen into helium
- C. Nuclear fission of uranium
- D. Gravitational friction alone

MAT

20 MCQs | 4 options each

Questions

181. Choose the word most nearly opposite in meaning to scarce.

- A. Rare
- B. Limited
- C. Abundant
- D. Insufficient

182. Complete the analogy:

Thermometer : Temperature :: Barometer : ?

- A. Humidity
- B. Atmospheric pressure
- C. Wind direction
- D. Rainfall

183. If all surgeons are doctors and some doctors are researchers, which conclusion must be true?

- A. All researchers are surgeons
- B. Some surgeons are researchers
- C. All surgeons are doctors
- D. No doctor is a researcher

184. Find the next number in the series:

4, 9, 19, 39, 79, __
4, \ 9, \ 19, \ 39, \ 79, \ \ \ 4, 9, 19, 39, 79, __

- A. 119
- B. 139
- C. 159
- D. 169

185. Find the next letter in the sequence:

B, E, I, N, T, ____

- A. X
- B. Y
- C. Z
- D. A

- 186. A student walks 8 m east, turns left and walks 6 m, then turns left and walks 8 m. Where is the student relative to the starting point?**
- A. 6 m north
 - B. 6 m south
 - C. 8 m east
 - D. At the starting point
- 187. If the code for a word is the sum of the alphabetical positions of its letters, what is the code for NURSE?**
- A. 65
 - B. 67
 - C. 69
 - D. 71
- 188. Choose the odd one out.**
- A. Triangle
 - B. Square
 - C. Pentagon
 - D. Sphere
- 189. Five students—P, Q, R, S, and T—stand in a line. P is before Q, R is after Q, and S is before P. Which order could be correct?**
- A. P, S, Q, R, T
 - B. S, P, Q, R, T
 - C. Q, P, S, R, T
 - D. S, R, P, Q, T
- 190. If yesterday was Thursday, what day will it be 10 days after tomorrow?**
- A. Sunday
 - B. Monday
 - C. Tuesday
 - D. Wednesday
- 191. A book marked at Tk 800 is sold at a discount of 15%. What is the selling price?**
- A. Tk 620
 - B. Tk 660
 - C. Tk 680
 - D. Tk 700

- 192. A mixture contains milk and water in the ratio 5:2. If the total mixture is 28 litres, how much water does it contain?**
- A. 6 L
 - B. 8 L
 - C. 10 L
 - D. 20 L
- 193. The average of five numbers is 18. Four of them are 12, 16, 20, and 24. What is the fifth number?**
- A. 16
 - B. 18
 - C. 20
 - D. 22
- 194. A machine produces 240 items in 6 hours at a constant rate. How many items will it produce in 9 hours?**
- A. 300
 - B. 320
 - C. 360
 - D. 400
- 195. If 3 workers can complete a job in 12 days, how many days would 6 workers take, assuming equal productivity and no other changes?**
- A. 3 days
 - B. 6 days
 - C. 12 days
 - D. 24 days
- 196. A fair die is rolled once. What is the probability of obtaining a number greater than 4?**
- A. $\frac{1}{6}$
 - B. $\frac{1}{3}$
 - C. $\frac{1}{2}$
 - D. $\frac{2}{3}$
- 197. Which number completes the pattern?**
 2483612510 ? $\begin{matrix} 2 & 4 & 8 \\ 3 & 6 & 12 \\ 5 & 10 & ? \end{matrix}$ 2354610812 ?
- A. 15
 - B. 18
 - C. 20
 - D. 25

198. A cube is painted on all six faces and then cut into 27 equal smaller cubes. How many small cubes have paint on exactly two faces?

- A. 8
- B. 12
- C. 6
- D. 1

199. A clock shows 3:00. What is the smaller angle between its hour and minute hands?

- A. 0°
- B. 45°
- C. 90°
- D. 180°

200. In a group of 40 students, 22 study Biology, 18 study Chemistry, and 10 study both. How many study neither subject?

- A. 8
- B. 10
- C. 12
- D. 14

__Best Wishes__