

“सर्वसुलभ र गुणस्तरिय शिक्षा, हाम्रो प्रतिबद्धता”

# **MECEE BL**

## **MODEL EXAM -XVII**

## **HINTS & SOLUTIONS**

**Date : 2083-06-03**



### Zoology

1. a) Schizophrenia is a group of severe mental disorders that have common symptoms as hallucinations, delusions, blunted emotions, disordered thinking. It can be caused by excessive dopamine production, alternation of neuropeptide and decreased frontal lobe activities. Recovery is possible with regular use of chlorpromazine along with psychosocial therapy.
2. c) Antibodies are glycoproteins and are secreted by mature vertebrate plasma cells which are modified form of B-cells. These selectively bind to epitopes of antigens and clumping them (agglutination) prior to phagocytic engulfment.
3. c) Physiological barriers like body temperature, pH of the body fluid, and various body secretions (saliva, tears) prevent growth of many disease causing micro-organisms. Skin is the physical barrier of the body. Its outer tough layer the stratum-corneum prevents the entry of bacteria and viruses.
4. b) Retroviruses are implicated as a cause of cancer in humans because they may carry cellular proto-oncogenes in their genome, when these proto-oncogenes gets converted into oncogenes due to some physical, chemical or biological agents they cause cancer.
5. d) *Wuchereria bancrofti* causes filariasis or elephantiasis.
6. b) Blastopore is the opening of gastrocoel. Gastrulation is a process of migration and rearrangement of cells which are already present in blastula, a new cavity is formed named archenteron or gastrocoel which open outside through blastopore.
7. a) Hormones are released in normal blood circulation but each hormone stimulates only a specific target organ to initiate a specific response. It is because of the presence of specific receptor protein only in the specific target cell. If these receptor molecules are removed from target organs, the organ will not respond to hormone.
8. d) Amnion is an extra embryonic membrane that surrounds embryo in reptiles, birds and mammals. It provides a kind of private aquarium to the embryo and protects it from mechanical shock and desiccation.
9. d) Thrombocytopenia occurs in dengue.  
Neutrophils - increased in acute infections (bacterial infection and pus forming infection)  
Lymphocyte - increased in chronic bacterial infections like tuberculosis & Leprosy.
10. b) Adrenaline hormone is responsible for this action, as adrenaline hormone is known as 3F hormone, i.e. fright, flight and fight.
11. b) To apply Koch's postulates, we have to culture the suspected causal organism *in vitro*. *Mycobacterium leprae* cannot be cultured *in vitro*. Hence, Koch's postulates are not applicable to leprosy.
12. a) Fibrous joints are immovable joints that occur between the bones of the cranium and in the tooth sockets. They do not allow movement because the bones are held firmly together by bundles of strong white collagen fibres. The immovable joints are often known as the sutures. The periosteum that covers the bones dips between them as a septum.
13. a) Snow blindness in high Himalayas is due to inflammation of cornea due to high dose of UV-B radiation. It is a painful, temporary loss of vision due to overexposure to the sun's UV rays. It also called 'photo keratitis'(photo = light, keratitis= inflammation of the cornea).

14. a) The kinesin, myosin and dynein proteins of skeletal muscle involve ATPase activity. This activity cause the contraction of skeletal muscles, propelling action of cilia and flagella and the intracellular transport of organelles.
15. b) Inflammation of joints due to the accumulation of uric acid crystals is gout. Fibrous joints are formed by the flat skull bones, which fuse end-to-end with the help of dense fibrous connective tissues in the form of sutures to form cranium. The vertebral column is formed by 26 serially arranged units called vertebrae. The less secretion of progesterone causes abortion as it basically supports pregnancy.
16. c) AIDS and Hepatitis-B are sexually transmitted diseases which do not specifically affect reproductive organs. AIDS affects the overall immune system of the individual and Hepatitis-B affects the liver. These are called STD because these spread through unsafe sex or unprotected sex.
17. b) If kidney fails to reabsorb water the concentration of urine will be low and urination will be more frequent, a condition called polyuria as a result, the tissues of the body will be dehydrated and shrink.
18. d) Primaquine is the only drug effective against dormant hypnozoites in the liver, preventing relapse.
19. b) Intentional or voluntary termination of pregnancy before full term is called Medical Termination of Pregnancy (MTP) or induced abortion. MTPs are considered relatively safe during the first trimester, i.e. upto 12 weeks of pregnancy.
20. b) *P. malariae* shows distinctive band-shaped trophozoites inside RBCs. Schüffner's dots = *P. vivax/ovale*, multiple ring forms + banana gametocytes = *P. falciparum*.
21. b)
  - Calciferous gland: Located in wall of stomach.
  - Neutralize acidity of soil.
22. a)
  - Ampulla: Provides nourishment in Pheretima only.
  - Diverticulum: Storage in Pheretima only.
  - Above functions are just opposite in other earthworm.
23. c)
  - Summer sleep and winter sleep: Cutaneous respiration.
  - Rest over land and during floating: Buccopharyngeal.
  - Swimming, leaping or heaping, breeding: Pulmonary.
24. c)
- |                           |              |
|---------------------------|--------------|
| Supra-pharyngeal ganglia  | 1 pair( CNS) |
| Sub-pharyngeal ganglia    | 1 pair (CNS) |
| Circum-pharyngeal ganglia |              |
25. b) A gap junction may nexus or macula communicans. These are specialized intercellular connection between a multitude of animal cell types. They directly connect the cytoplasm of two cells, which allows various molecules, ions and electrical impulses to directly pass through a regulated gate between cells.
26. d)
  - From stomach: Fundus absent.
  - From intestine: Jejunum absent.
  - Duodenum: U-shaped (Frog) & c-shaped-human.
27. a) A comparative study of the banding of chromosomes of man and the great apes has shown that the total amount of DNA in human diploid cells and that of apes is more or less similar. The banding pattern of human chromosome numbers 3 and 6 are compared with those of particular autosomes in the chimpanzee, which shows a

- common origin. More over, blood protein test also proves that man is most closely related to great apes (chimpanzee and gorilla).
28. c) The circulatory system in which two distinct and separate circulatory pathways for blood flow are involved, is called double circulatory system (also, double-loop circulatory system). It occurs in mammals and birds. Whale is a mammal, so it shows above characteristic.
  29. d) *Homo erectus* was a large hominid. It had a length of about 150 to 170 cm (5 to 5.5 feet) with a low but distinct forehead strong browridge and a brain capacity of about 1000 cc. *Homo erectus* was social and living in tribes of 20 to 50 people and thus had a successful and complex culture. It became widespread throughout the tropical and temperate old world.
  30. c) Both male and female pigeon secrete milk through crop during breeding season.
  31. b) *Torpedo* is a marine cartilaginous fish which produces 8-220 volt electric charge (current) depending on species. Their electric organs are modified lateral muscle plates innervated by cranial nerves.
  32. d) Cephalopoda contains the most specialised molluscs including squids, *Octopus*, cuttle fish. In these animals well developed eyes are present which resembles vertebrate eyes.
  33. c) *Musca* (house fly) is the carrier of many disease as anthrax, trachoma, diarrhoea, tuberculosis, leprosy, gangrene, plague, gonorrhoea, typhoid, cholera and dysentery.
  34. a) Platyhelminthes are bilaterally symmetrical, triploblastic and acoelomate animals with organ level of Organization. Aschelminthes are bilaterally symmetrical, triploblastic and pseudocoelomate with organ system grade of body organisation. Annelida are bilaterally symmetrical, triploblastic and truly schizocoelomate. Ctenophora are biradially symmetrical, triploblastic and acoelomates.
  35. d) Sea anemone is a coelenterate found in marine water, attached to the empty shell of gastropods already occupied by hermit crab, this association is symbiosis not parasitism. Tapeworm, mosquito and leech are parasites.
  36. b) Because the nervous system of cockroach consists of a series of fused segmentally arranged ganglia joined by paired longitudinal connectives on the ventral side. Three ganglia, i.e. in the thorax and six in the abdomen. In this way cockroach nervous system is spread throughout the body. The head holds a bit of a nervous system, while the rest is situated along the ventral (belly side) part of its body. Therefore if the head region of a cockroach is removed it may live for few days.
  37. a) Potassium( $K^+$ ) is an essential element, loosely held to the apoenzyme part of the enzyme.  $K^+$  is an inorganic cofactor (metal activator) of enzyme pyruvate kinase.
  38. a) To maintain electrostatic neutrality of plasma, many chloride ions diffuse from plasma into RBCs and bicarbonate ions pass out. The chloride content of RBCs increases when oxygenated blood becomes deoxygenated. This is termed as chloride shift or Hamburger shift.
  39. b) Evolution of modern man is accompanied by the reduction in length of jaw bones and teeth lines becoming semi-circular instead of U-shaped.
  40. d) According to Hardy-Weinberg principle, allele frequencies in a population are stable and is constant from generation to generation only if the following conditions are met (i) There is no mutation, no gene flow and all mating is random. (ii) All genotypes reproduce equally well (i.e., no natural selection). But all these conditions are rarely met in nature.

### Botany

41. b)
42. c) The cell walls of fungi are composed of chitin, a structural polysaccharide, which is polymer of NAG (n-acetyl Glucosamine).
43. d) The three nonsense codons are UAA (ochre), UAG (amber), and UGA (opal)
44. b) Transcription is the process where a gene's DNA sequence is copied into a messenger RNA (mRNA) molecule.
45. d) This is a dihybrid cross. The probability of getting tt is 1/4, and the probability of getting yy is 1/4. The combined probability is  $(1/4) \times (1/4) = 1/16$ .
46. b) Lysosomes contain hydrolytic enzymes that are responsible for the breakdown and recycling of waste materials and worn-out cellular components.
47. c) Hyaloplasm is also called cytosol. Trophoplasm is the portion of a cell's cytoplasm that is rich in nutritive substances
48. c) The nucleoplasm provides the environment and enzymes (like DNA polymerase, helicase, ligase) required for DNA replication
49. b) Humans have 22 pairs of autosomes and one pair of sex chromosomes (XX or XY).
50. b) The Golgi apparatus modifies, sorts, and packages proteins and lipids into vesicles for transport to their final destinations.
51. b)
52. c) Mitosis is an equational division that produces two daughter cells genetically identical to the parent cell. Thus, the chromosome number and ploidy remain the same.
53. c) The Casparian strip is a waxy layer( suberized layer) in the cell walls of the endodermis that forces water and dissolved minerals to pass through the endodermal cells rather than between them.
54. c) Transpiration causes a significant loss of water, which can be detrimental. However, it is essential for the upward movement of water and minerals (transpirational pull) and for cooling the plant.
55. b) Short-day plants require a long, uninterrupted period of darkness to flower. Far-red light is perceived as an interruption to the dark period, which inhibits flowering.
56. d) Chlorophyll pigments, the primary photosynthetic pigments, efficiently absorb light in the blue and red parts of the spectrum, but reflect green light, which is why leaves appear green.
57. c) Ethylene is a gaseous plant hormone primarily responsible for the ripening of fruits.
58. b) Lenticels are porous areas in the bark of woody stems that allow for the exchange of gases between the atmosphere and the internal tissues of the stem.
59. b) The vascular cambium is a lateral meristem that produces new vascular tissues. It adds secondary xylem (wood) to the inside and secondary phloem to the outside, leading to an increase in the stem's girth.
60. c) Mosses belong to the group Bryophyta, which lack specialized vascular tissues (xylem and phloem).
61. b) Gymnosperms produce their reproductive structures in the form of cones, which bear the "naked" seeds.
62. c) The capsule is the sporophyte generation of a bryophyte. Its main function is to produce haploid spores through meiosis for dispersal and reproduction.
63. b) Bacteria are living, single-celled organisms that can reproduce independently. Viruses are non-living parasites that require a host cell to replicate.
64. b) The need for motile, swimming sperm is a characteristic feature of bryophytes (and pteridophytes), which rely on water for reproduction.

65. c) The mycelium is the vegetative part of a fungus, consisting of a network of thread-like structures called hyphae.
66. a) Floral characters are genetically stable and less susceptible to variations caused by environmental conditions, making them a more reliable basis for classification.
67. c) Pteridophytes (ferns) were the first group of plants to evolve true vascular tissue (xylem and phloem) and stomata, allowing them to grow taller and live in drier environments than bryophytes.
68. c)
69. c) Most monocots (like cereals, grasses) produce a dry, single-seeded fruit called caryopsis.
70. a) An aggregate fruit (e.g., strawberry) develops from a single flower with multiple separate pistils/carpels. A multiple fruit (e.g., pineapple) develops from a cluster of flowers that fuse together.
71. b) Producers (plants and algae) form the base of the food chain as they generate their own food and energy, which is then consumed by other trophic levels.
72. b) Biomagnification is the process by which the concentration of a substance, such as a pesticide or heavy metal, increases as it moves up the food chain.
73. c) CFCs are a class of compounds that, when released into the atmosphere, break down ozone molecules, leading to the thinning of the protective ozone layer.
74. a)
75. a)
76. b) Triple fusion is the fusion of a male gamete with the two polar nuclei of the central cell in the embryo sac, which gives rise to the triploid endosperm.
77. c) A callus is an undifferentiated mass of cells that forms in response to injury or as a result of the growth of plant tissue in an artificial culture medium.
78. d)
79. c)
80. a)

### Chemistry

81. a)  $\Sigma \text{ Masses of reactants} = \Sigma \text{ Masses of products}$   
 $(3 + 11.2) \text{ g} = (8.8 + 5.4) \text{ g}$   
Hence, law of conservation of mass is verified.
82. b) Equivalent mass of element =  $\frac{\text{Mass of element}}{\text{Mass of oxygen}} \times 8 = \frac{80}{20} \times 8 = 32$
83. d) The energy changes are taking place continuously is not according to Bohr's model.
84. c)  $m$  cannot be -3 for  $l = 2$ .
85. d) In beta decay, a neutron transforms into a proton, which means the number of neutrons decreases while the number of protons increases, resulting in a lower neutron-to-proton ratio.
86. d) The graph of  $P$  and  $V$  at constant temperature is called isotherm.
87. c) When a liquid is the dispersed phase and gas is the dispersion medium, the colloidal system is called an aerosol. Examples include clouds, fog, and insecticide sprays.
88. a)  $\Delta S_{\text{fusion}} = \frac{\Delta H_{\text{fusion}}}{T_{\text{mp}}}$   
 $5.26 = \frac{1.435 \times 1000}{T_{\text{mp}}}$   
 $T_{\text{mp}} = \frac{1435}{5.26} = 273 \text{ K, i.e., } 0^\circ \text{C}$

89. c)  $\text{Rate} = -\frac{d[A]}{dt} = -\frac{d[B]}{dt} = \frac{1}{2} \frac{d[C]}{dt} = \frac{d[D]}{dt}$
90. a) A catalyst lowers the activation energy of a reaction by providing an alternative pathway that requires less energy for the reactants to overcome, thus speeding up the reaction.
91. c) The value of equilibrium depends only on temperature.
92. a) For  $\text{Ag}_2\text{CrO}_4$ ,  $K_{sp} = 4s^3$
93. b) Cl has O. S. as -1, +1 +3 +5 and +7
94. c) 0.1 F will liberate 0.1 gev of  $\text{Cl}_2 = 3.545 \text{ g}$ .
95. b)  $\ln k = \ln A - \frac{E_a}{RT}$ , intercept is  $\ln A$ .
96. c) Butter (liquid - solid) water dispersed in fat.
97. d)  $A + e^- \rightarrow A^-$  has large negative potential. It means  $A^-$  is readily oxidized, the reaction proceeds towards left hand side.
98. c) Sea water is purified by reverse osmosis.
99. c) When sodium metal dissolves in liquid ammonia, it forms a deep blue colored solution due to the presence of "ammoniated electrons" which are essentially electrons trapped within the ammonia molecules.
100. c)  $2\text{AgCl} + \text{Na}_2\text{CO}_3 \rightarrow \text{Ag}_2\text{CO}_3 + 2\text{NaCl}$
- $\text{Ag}_2\text{CO}_3 \xrightarrow{\Delta} 2\text{Ag} + \text{CO}_2 + \frac{1}{2} \text{O}_2$
101. a) Dicalcium silicate sets at the lowest rate.
102. b) The bicarbonates of alkaline earth metals exist in solution Only.
103. a) Since bond energy of  $\text{C-F} > \text{C-Cl} > \text{C-Br} > \text{C-I}$   
Hence  $\text{CF}_4$  is most stable.
104. a)  $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$  (in blast furnace).
105. c) Pickling is removal of basic oxide layers on metals before electroplating.
106. b) For this calculate the formal charge distributed on each

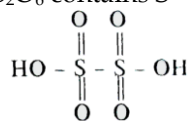
P-H bond which is given by  $= \frac{\text{Total charge}}{\text{No. of P-H bonds}}$

The more the formal charge the lesser is the covalent character. The formal charges are:

$$\text{P}_2\text{H}_6^{2+} = \frac{+2}{6} = +0.33; \text{P}_2\text{H}_5^+ = \frac{+1}{5} = +0.2; \text{PH}_4^+ = \frac{+1}{4} = +0.25$$

Hence lowest covalent character of P-H bond is In  $\text{P}_2\text{H}_6^{2+}$ .

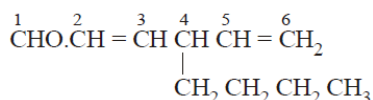
107. c)  $2\text{PCl}_5 + 8\text{H}_2\text{O} \rightarrow 2\text{H}_3\text{PO}_4 + 10\text{HCl}$ , the product formed is phosphoric acid.
108. c)  $\text{H}_2\text{S}_2\text{O}_6$  contains S - S bond as:



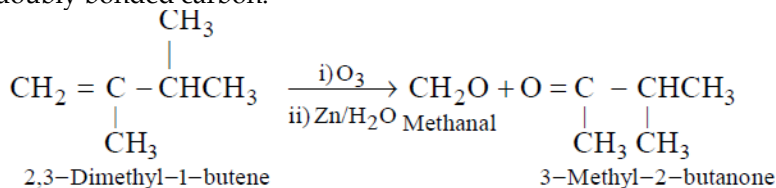
109. a)  $\text{HCOOH} \rightarrow \text{H}_2\text{O} + \text{CO}$  (Dehydration)
110. c)  $\text{SO}_2 + 2\text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4 + 2\text{H}$ . Bleaching action is due to reduction.
111. c)  $2\text{Na}_2\text{S}_2\text{O}_3 + \text{I}_2 \rightarrow \text{Na}_2\text{S}_4\text{O}_6 + 2\text{NaI}$   
sodium tetrathionate
112. d) Since transition metals can lose electrons from  $(n-1)d, ns$  orbitals hence they are valence orbitals.
113. d) Immiscible liquids means they don't mix with each other. In a separating funnel, the mixture is poured in, and the liquids form layers based on their densities. The denser liquid settles at the bottom, and the less dense liquid forms the top layer. Then, the

denser liquid can be drained out through the stopcock at the bottom, leaving the less dense liquid behind.

114. b) Carbon chain should include all functional groups, although it may be smaller in length, -CHO should be given lowest number.



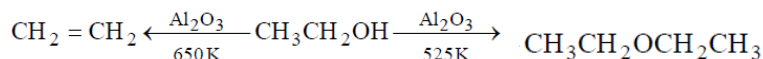
115. b) Since  $sp$  orbital has the smallest size,  $sp^3$  carbon attached to  $sp$  carbon, i.e.,  $sp^3$ - $sp$  bond should have minimum carbon-carbon single bond length.
116. c) The intermediate planar carbonium ion has equal chances to be attacked from either side leading to racemization.
117. b) trans-2-butene: In the trans configuration, the two methyl groups are on opposite sides of the double bond, which cancels out their individual dipole moments, resulting in a net dipole moment of zero.
118. d) Tartaric acid has a chiral carbon atom, meaning it has four different groups attached to it, allowing it to exist in different enantiomeric forms, making it optically active.
119. c) The correct general formula for an alkyne is c)  $C_nH_{2n-2}$ .
120. c) In such questions, break the molecule at double bond by adding oxygen atom at each doubly bonded carbon.



121. b) Symmetrical alkenes (option b) give similar products whether the addition is according to Markovnikov's rule or according to peroxide effect.

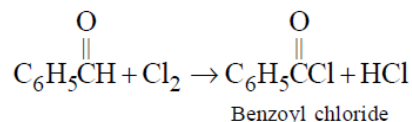
122. a) It is the property of primary amine.

123. c)



124. c) Picric acid is 2,4,6-trinitrophenol, hence obtained by nitration of phenol.
125. a) Peroxides are unstable compounds that form when ethers react with oxygen in the presence of light, and they can be highly explosive under certain conditions.
126. b) The Wolff-Kishner reduction is a chemical reaction that uses hydrazine and a strong base to convert a carbonyl group ( $\text{C}=\text{O}$ ) in an aldehyde or ketone into a methylene group ( $\text{CH}_2$ ).

127. c)



128. d) Hydrolytic reaction of fats with caustic soda is known as saponification.
129. c) More the electron density on N, higher will be the basicity. Density on N is influenced by the (i) nature of the group (+I or -I) present in alkyl group or benzene nucleus and

- (ii) resonance (delocalisation of the electron present on N). In  $(C_6H_5)_3N$ : electron pair is delocalized to the maximum extent due to three benzene rings and hence least available for protonation, thus it will be least basic.
130. d) Nylon and cellulose, both have intermolecular hydrogen bonding, polyvinyl chloride has dipole-dipole interactions, while natural rubber has van der Waal forces which are weakest.

### Physics

131. d) Work and energy have the same dimensions
132. c) At the topmost point of a projectile motion acceleration and velocity are perpendicular to each other
133. b) Because here tension is maximum.
134. b) A jet plane flies in the air because the thrust of the jet compensates for the force of gravity.
135. a) Maximum value of static friction is called Limiting friction
136. a) In explosion, total kinetic energy increases.
137. b)  $6R$  from the surface of earth and  $7R$  from the centre of earth.
138. c) The longitudinal strain is only possible in Solids
139. c) This happens due to viscosity.
140. a)  $PE = \frac{1}{2} m\omega^2 x^2$   
It is clear PE will be maximum when  $x$  will be maximum i.e. at  $x = \pm A$
141. a)  $W = P\Delta V = R\Delta T = 8.31 \times 1J = \frac{8.31}{4.2} \text{ cal} = 1.98 \text{ cal}$
142. c) Heat required in the given process  
 $= Q_1 + Q_2 + Q_3 = 1 \times 80 + 1 \times 1 \times (100 - 0) + 1 \times 536 = 716 \text{ cal}$
143. c) In adiabatic process, no heat transfers between system and surrounding.
144. d)  $C \propto \frac{1}{\sqrt{m}}$
145. a)  $\eta = 1 - \frac{T_2}{T_1} = 1 - \frac{(273 + -123)}{(273 + 27)} = 1 - \frac{150}{300} = \frac{1}{2} = 50\%$
146. b) Rate of cooling  $= \frac{-d\theta}{dt} \propto \left( \frac{\theta_1 + \theta_2}{2} - \theta_0 \right)$   
In second case average temperature will be less hence rate of cooling will be less. Therefore time taken will be more than 4 minutes.
147. b) The frequency being the property of source emitting it, it does not change on reflection.
148. b)  $\delta = A (\mu - 1)$

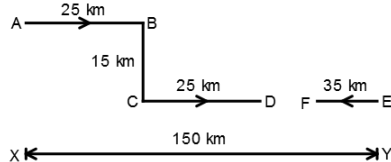
- $5^\circ = A(1.5 - 1)$   
 $5^\circ = A \times 0.5 \quad A = 10^\circ$
149. a)  $\frac{1}{f} = (\mu - 1) \left( \frac{1}{R_1} + \frac{1}{R_2} \right)$  for a plane glass plate,  $R_1 = \infty$ ,  $R_2 = \infty$   
 $\frac{1}{f} = 0 \quad f = \infty \quad P = \frac{1}{f} = 0$
150. b)  $\beta = \frac{\lambda D}{d} \quad \beta \propto \lambda$   
 $\frac{\beta'}{\beta} = \frac{\lambda'}{\lambda} = \frac{2\lambda}{\lambda} \quad \beta' = 2\beta$
151. b)  $\theta = \sin^{-1} \left( \frac{\lambda}{d} \right) = \sin^{-1} \left( \frac{6000 \times 10^{-10}}{12 \times 10^{-7}} \right) = \sin^{-1} \left( \frac{1}{2} \right) = 30^\circ$
152. d)  $\tan \theta_p = \mu = \frac{C}{V} = \frac{3 \times 10^8}{1.5 \times 10^8}$   
 $\tan \theta_p = 2$   
 $\theta_p = 63.43^\circ$
153. a) Beats period =  $\frac{1}{30 - 20} = 0.1$  sec  
 $\Delta \phi = \frac{2\pi}{T} \Delta t = \frac{2\pi}{0.1} \times 0.6 = 2\pi \times 6 = 12\pi$  or zero
154. c)  $f_A = f_B + x = 256 + 3 = 259$  Hz
155. c) String vibrates in five segment so  $\frac{5}{2} \lambda = l \Rightarrow \lambda = \frac{2l}{5}$   
 Hence  $n = \frac{v}{\lambda} = 5 \times \frac{v}{2l} = 5 \times \frac{20}{2 \times 10} = 5$  Hz
156. d) Electric field intensity for A line charge of infinite length  
 $E = \frac{\lambda}{2\pi\epsilon_0 r} \quad \therefore E \propto r^{-1}$
157. c) The rod must be charged with static electricity due to which it induces opposite nature in water and hence attracts it.
158. c)  $Q = \frac{1}{2} CV^2 = \frac{1}{2} \times 2 \times 10^{-6} \times 100^2 = 0.01$  J
159. a) For maximum energy, we have  
 External resistance of the circuit  
 = equivalent internal resistance of the circuit i.e.  $R = \frac{r}{2}$

160. b)  $\because i_g = (100 - 90)\% \text{ of } i = \frac{i}{10}$   
 $\Rightarrow \text{required shunt } S = \frac{G}{(n-1)} = \frac{900}{(10-1)} = 100\Omega$
161. c) The material of fuse wire should have high specific resistance and low melting point
162. c)  $H = \frac{V^2}{R} t \Rightarrow \frac{H_1}{H_2} = \frac{R_2}{R_1} = \frac{4}{2} = \frac{2}{1}$
163. c) To make the field radial in a moving coil galvanometer poles are cylindrically cut.
164. b) Magnet provides damping
165. b) Energy stored  $E = \frac{1}{2} Li^2 = \frac{1}{2} \times 50 \times 10^{-3} \times 4 = 0.1\text{J}$
166. b)  $P = \frac{V_{rms}^2}{R} = \frac{(30)^2}{10} = 90 \text{ W}$
167. d) In tangent galvanometer  
 $i \propto \tan\theta$   
 $i_1 / i_2 = \tan 60^\circ / \tan 30^\circ$   
 $i_2 = 6 \text{ A}$
168. b)  $K = QV = e \times V = eV$
169. c) The de-Broglie wavelength is  $\lambda = \frac{h}{|p|} = \frac{h}{|J|} \Rightarrow \lambda \propto \frac{1}{|J|}$
170. a) In tungsten, photoemission takes place with a light of wavelength  $2300 \text{ \AA}$ . As emission of electron is inversely proportional to wavelength, all the wavelengths smaller than  $2300 \text{ \AA}$  will cause emission of electrons
171. d) From the formula  
 $V = \frac{12375}{\lambda_{\min}} = \frac{12375}{0.3094} = 39.99 \text{ kV} \approx 40 \text{ kV}$
172. a) Boron rods in a nuclear reactor are used to absorb excess neutrons.
173. b)  $N/N_0 = (1/2)^n$   
 $1/64 = (1/2)^{60/T_{1/2}}$   
 $T_{1/2} = 10 \text{ sec}$
174. b)
175. b)  $MC^2 + MC^2 = E$   
 $M = \frac{E}{2C^2}$
176. c) p-type semiconductor has holes as majority charge carriers.
177. c) NAND gate is called universal gate because all other gates can be constructed by the combination of two or more NAND gates. NOR gate is also called universal gate.
178. b) The particle-antiparticle pair is electron and positron.
179. c) Magnitude of Gorkha earthquake is 7.8 Mw.

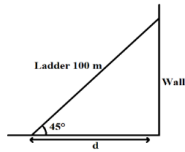
180. b) Hubble's law states that the velocity with which milky way is moving away from the earth is proportional to distance of milky way from the earth.

MAT

181. b)  
 182. c) Reptile's example is lizard and Daisy is an example of Flower.  
 183. c) Let the amount invested by Prakriti and Suchitra be  $3x$  and  $5x$  respectively. So,  
 We have, 10% of Prakriti's amount = Rs 9000,  $x = 30000$   
 So, Suchitra's initial investment =  $5x = 5 \times 30000 = \text{Rs } 150000$   
 184. d) Since, the clock is 15 minutes slow for every hour and it showed correct time at 12:00 PM.  
 The correct time must be:  
 $= 3 \text{ O'clock} + 3 \times 15 \text{ minute} = 3:45 \text{ PM.}$   
 185. c)  
 186. c) The first, third and fifth letters are same but in the place of second and fourth letters previous two letters are used) So, LIGHT = LGGFT.  
 187. d)  $aabaa/bbabb/aabaa/bbabb$   
 188. a) Required Distance =  $DF = 150 - (25 + 25 + 35) = 150 - 85 = 65 \text{ km}$



189. c) Float means above water and sink means under water. In same way, Boat floats on water and submarine moves under water.  
 190. a) From Question,



$$\cos 45^\circ = \frac{d}{100 \text{ m}} \text{ or, } d = 100 \times \frac{1}{\sqrt{2}} = \frac{100}{\sqrt{2}} \text{ m}$$

191. c) Possible arrangement : Santosh, Ramesh, Sumit, Sanjeev, Naresh  
 192. c) The only word that can be formed is "CHEMISTRY". Thus, fifth letter of Chemistry is I.  
 193. b)  $C_1 + C_3 + C_2 + C_4 = 22$   
 194. d) The development sequence of a plant is given. i.e. (Root, stem, leaf, flower & fruit). Thus, option 'd' is correct.  
 195. d)  $\frac{1}{2}\% = \frac{1}{2} \times \frac{1}{100} = \frac{1}{200} = 0.005$   
 196. c)  
 197. c) Speed =  $45 \times \frac{5}{18} \text{ m/sec} = \frac{25}{2} \text{ m/sec}$ , Time = 30 sec  
 Let the length of bridge be  $x$  meters Then,  $\frac{130+x}{30} = \frac{25}{2} \Rightarrow x = 245 \text{ m}$   
 198. d) All the figures are divided into parts based on no. of sides except in (d) in which Pentagon with 5 sides is only divided into 3 parts.  
 199. b) Assumption I goes against the statement. So, it is not implicit. The allowance will serve as a reward to the employees and shall provoke them to come on time. So, II is implicit.  
 200. b) Top left+centre=top right and bottom right+centre=bottom left

===== Best of Luck =====