

“सर्वसुलभ र गुणस्तरिय शिक्षा, हाम्रो प्रतिबद्धता”

MECEE BL

MODEL EXAM -XVI

HINTS & SOLUTIONS

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Zoology

1. a) The law states "Ontogeny recapitulates phylogeny".
Developmental stages through which the organism passes (Ontogeny) repeats the evolutionary history (Phylogeny) of group to which it belongs.
2. a) Analogous organs have similar appearance and function but differ in their origin and basic structure. Also called Homoplastic organs. Suggest convergent evolution.
3. b) Sphincter of Oddi is the smooth muscle or a muscular-valve that surrounds the end portion of the common bile duct and pancreatic duct (hepato-pancreatic duct). It controls the flow of digestive juices into the intestine.
4. (a) About 98% of the mass of every living organism including bacterium and human beings is composed of just six elements, i.e. Carbon (C), Hydrogen (H), Nitrogen (N), Oxygen (O), Phosphorus (P) and Sulphur (S).
5. b) Destruction of the anterior horn cells of the spinal cord would result in loss of voluntary motor impulses. It is because the anterior horn cells (also called anterior grey column), which is the front column of grey matter in the spinal cord contains motor neurons that affect the axial muscles.
6. c) Myasthenia gravis is defined as an autoimmune neuromuscular disorder that leads to fluctuating muscle weakness and fatigue. The cause of this disease is circulating antibodies that will block acetylcholine receptors at the post-synaptic neuromuscular junctions.
7. b) There are four classes of teeth, i.e. incisors, canines, premolars and molars. There are no premolars in primary dentition (deciduous or baby teeth). These are found only in permanent dentition (adult teeth).
8. c) Angiotensinogen is a plasma protein produced and secreted by the liver cells. Renin is secreted from juxtaglomerular cells and acts enzymatically on angiotensinogen to release 10 amino acid containing peptide angiotensin-I. Macula densa is actually a plaque in wall at the end of thick ascending limb of nephrons.
9. d) Kwashiorkor disease is due to protein deficiency not accompanied by calorie deficiency in the children of age 1-5 years. Its symptoms are weak muscle, thin limbs, retarded growth of the body and brain, swelling of legs due to retention of water (oedema), reddish hair, potbelly, etc.
10. b) Severe diarrhoea, vomiting, watery stools are the chief symptoms of cholera. All these lead to dehydration. The toxin secreted by *Vibrio cholera* causes a continuous activation of adenylate cyclase of intestinal epithelial cells. The resultant high concentration of cAMP triggers continual secretion of Cl^- , HCO_3^- and water into the lumen of the intestine. Administration of saline not only supports the sodium-potassium pump through which water in cell is restored, but glucose is also symported along with sodium.
11. d) The Expiratory Capacity of athlete will be 1500mL. It can be calculated as
Given, Tidal Volume (TV) = 500mL
Expiratory Reserve Volume (ERV) = 1000mL
Expiratory Capacity = $\text{TV} + \text{ERV} = 500 + 1000 = 1500\text{mL}$
12. d) The nodal musculature has the ability to generate action potentials without any external stimuli, i.e. it is autoexcitable. However, the number of action potentials that could be generated in a minute vary at different parts of the nodal system. The SAN (Sino-Atrial Node) can generate the maximum number of action potentials, i.e. 70-75/min, i.e. the highest rate of depolarisation and is responsible for initiating and

- maintaining the rhythmic contractile activity of the heart. Therefore, it is called pacemaker.
13. b) Urea is synthesised in liver. So, maximum amount of urea is present in hepatic vein and minimum in renal vein.
 14. a) Cleavage divisions are mitotic division, in which the single-celled zygote is converted into a multicellular morula. But during cleavage divisions, there is no growth of resultant daughter cells / blastomeres. So, the DNA content will increase, but there is no increase or insignificant increase in amount of protoplasm.
 15. c) Neurons are excitable cells because their membrane are in a polarized state. Different types of selectively permeable channels are present on the neural membrane. When a neuron is not conducting any impulse, or in the resting stage, the axonal membrane is comparatively more permeable to potassium ion (K^+) and nearly impermeable to sodium ion (Na^+).
 16. c) Osteoporosis is caused by decreased level of oestrogen. Oestrogen deficiency causes both the early and late forms of osteoporosis in post-menopausal women. Osteoporosis is thinning or weakening of bones which makes them fragile and more likely to break.
 17. b) Tight junction helps to stop the leakage of the substances across a tissue and Gap-junction are channels that physically connect neighbouring cells, mediating the rapid exchange of small molecules or ions. Adhering junction are cell-cell junction complexes that make important contribution to embryogenesis and tissue homeostasis.
 18. c) Colostrum, the yellowish fluid, secreted by mother during the initial days of lactation is very essential to impart immunity to the newborn infants because it contains immunoglobulin A. The type of immunity provided by colostrum is natural passive immunity. As IgA is secreted in mother's milk, it is also called secretory immunoglobulin. Monocytes are a type of white blood cell having simple oval nucleus.
 19. a) Smooth muscle fibres are spindle-shaped, thick in the middle and thin at either ends, uninucleated, no sarcolemma, contraction is slow, involuntary under the control of autonomous nervous system.
 20. d) Cell organelles and nucleus are absent in mature red blood cells. Therefore, aerobic respiration does not take place in Red blood cells.
 21. d) The inner ear contains crista ampullaris and macula as the specific receptors of the vestibular apparatus responsible for maintenance of balance of the body and posture.
 22. a) Scent or musk glands are located around the face, feet or anus of many mammals. These secrete pheromones which may be involved in defence, recognition and territorial behaviour.
 23. d) Gorilla, chimpanzee, monkeys and humans these all belong to same order Primata of class – Mammalia.
 24. c) When a bone is kept in dilute acid for a few days, the salts get dissolved, leaving only soft and flexible organic matrix (decalcification).
 25. d)
 26. c) Merozoites are the progeny of sporozoites, formed in the liver of human. These are produced several days after the initial infection, which enter the blood stream and infect erythrocytes.
 27. d) The reappearance of malaria in humid warm conditions is due to the mosquito larvae in permanent waters.

28. a) The body cavity (coelom) of earthworm is filled with an alkaline, colourless or milky coelomic fluid containing water, salts, some proteins and four types of coelomic corpuscles i.e. phagocytes, mucocytes, circular nucleated cells and chloragogen cells. During burrowing the coelomic fluid becomes turgid and acts as hydraulic skeleton.
29. d) Main part of hyoid apparatus is a broad, flat and squarish plate, also called basilingual plate, because it provides attachment and support to the tongue.
30. d) In *Hirudinaria* locomotion takes place by looping and swimming in which its posterior suckers provide help as setae.
31. b) *Pheretima posthuma* is useful for farmers as they enrich the soil by their excretory wastes and make the soil porous.
32. b) In Porifera (sponges), bodies are asymmetrical. Body lacks tissue or organs, but from a meshwork of cells surrounding channels that open to the outside through pores, and that expand into internal cavities lined with food filtering flagellated cells.
33. b) *Fasciola hepatica* infects its intermediate host (fresh water gastropods) at miracidium stage and its primary host at metacercaria stage.
34. c) Embryologically pseudocoel may be a persistent blastocoel. Such type of coelom is found in Nematohelminthes.
35. c) *Nereis* living in burrows in sand or mud often with clams. Scorpion are abundant in deserts. Cockroach are found in warmth, dampness and plenty of organic food to devour. *Lepisma* (silver fish) residing in damp cool places and feeding on starch of starchy matter.
36. d) Kangaroo, hedgehog, dolphin and loris are all mammals. These give birth to young ones.
37. b) Cyclostomata is a class belonging to section 1-Agnatha of subphylum-Vertebrata. It is a paraphyletic superclass of jawless fishes. They lack paired fins too. Thus, option (b) is correct.
38. c) Kala-azar and oriental sore both the disease are caused by *Leishmania*. It is digenetic and intermediate host is sand fly belonging to the genus *Phlebotomus*. *L. tropica* causes oriental sore or cutaneous leishmaniasis in man.
39. b) Insects including cockroach excrete nitrogenous waste in the form of soluble potassium urate which is liberated into the haemo lymph and taken up by the cells lining the Malpighian tubules. The tubules facilitate the absorption of urate by stirring up the blood. In the cells of the tubule the potassium urate reacts with water and carbon dioxide (from respiration) to form potassium hydrogen carbonate and uric acid. The former is absorbed back into the blood, but the later is excreted.
40. c) Cancerous cells have high telomerase activity. The maintenance of telomere stability is required for the long-term proliferation of tumors. This makes telomerase a target not only for cancer diagnosis but also for the development of novel anti-cancer therapeutic agents, e.g. telomerase inhibitors are used in cancer treatment.

Botany

41. b) The Smooth Endoplasmic Reticulum is a network of membranes that lacks ribosomes and is the primary site for the synthesis of lipids, steroids, and phospholipids within the cell.
42. b)
43. a) In prophase, the nuclear envelope and the nucleolus disintegrate, and the chromatin condenses into visible chromosomes.

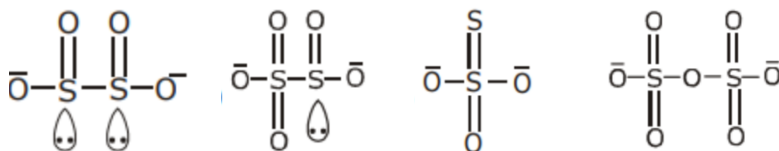
44. b)
45. b) The cross is $Rr \times rr$. A Punnett square for this cross shows the possible genotypes for the offspring are Rr (round) and rr (wrinkled), each with a 50% probability.
46. c) The central dogma states that genetic information flows from DNA (transcription) to RNA, which is then used as a template to synthesize protein (translation).
47. b)
48. c) Chargaff's rule establishes the base-pairing relationships in DNA, stating that the amount of adenine is always equal to the amount of thymine ($A=T$), and the amount of guanine is equal to the amount of cytosine ($G=C$).
49. b)
50. a) Cellulose (polymer of B-D glucose) is the main component and the most abundant organic substance on earth.
51. c) The fluid mosaic model depicts the cell membrane as a flexible mosaic of protein molecules embedded in a fluid bilayer of phospholipids.
52. c)
53. b) Translocation is the transport of sugars (food) from the leaves to other parts of the plant, a function performed by the phloem tissue.
54. c) The specialized guard cells surrounding the stomata control their opening and closing by changing their shape in response to changes in their own turgor pressure.
55. c) The light-dependent reactions convert light energy into chemical energy, producing ATP and NADPH, which are crucial for the subsequent Calvin cycle.
56. a) Phototropism is the growth of a plant in response to a light stimulus. The stem bending towards the light is a positive phototropic response.
57. a) Auxin is a plant hormone that promotes cell elongation in shoots and is responsible for phototropism and apical dominance.
58. b) Guttation is the exudation of liquid water from the edges of leaves, especially when humidity is high and transpiration is low. This is different from transpiration, which is the loss of water in vapor form.
59. c) Collenchyma tissue provides flexible support to growing parts of the plant, such as stems and petioles, without restricting growth.
60. b) The gametophyte is the main, photosynthetic plant body in bryophytes (e.g., mosses), while the sporophyte is a smaller, dependent structure.
61. b) Monocarpic plants → Flower and set fruit only once in their lifetime, then die. Examples: Agave, Bamboo, Wheat, Rice.
Monoecious → Plant having both male and female flowers on the same plant (e.g., Maize, Cucumber).
Annual → Plants that complete their life cycle in one growing season (may be polycarpic or monocarpic).
62. d)
63. c) Chilgoza → edible seeds of *Pinus gerardiana* (a Himalayan pine). It belongs to gymnosperms (conifers).
A botanist discovers a plant with a dominant sporophyte, no true flowers, and seeds contained
64. d) The presence of a dominant sporophyte and seeds within cones are key features of gymnosperms. This distinguishes them from angiosperms (which have flowers and fruits) and pteridophytes/bryophytes (which do not produce seeds).
65. c)

66. c) Root hairs are tiny extensions of epidermal cells that significantly increase the surface area of the root, allowing for efficient absorption of water and minerals from the soil.
67. b) Viruses are obligate intracellular parasites, meaning they are metabolically inert and cannot reproduce or carry out life processes without a host cell's machinery.
68. c) A rigid cell wall made of peptidoglycan is a distinguishing feature of most bacteria, setting them apart from other organisms.
69. a) The presence of a fibrous root system, parallel leaf venation, and floral parts in multiples of three are all defining characteristics of a monocot plant.
70. b) Corm = a short, swollen, underground stem that stores food and helps in perennation and vegetative propagation. Example: Colocasia (Arum), Gladiolus, Amorphophallus (elephant foot yam)
71. b)
72. a)
73. b) Eutrophication is the process where a body of water becomes overly enriched with nutrients, such as from fertilizer runoff, leading to an overgrowth of algae and aquatic plants.
74. b) Global warming is caused by the greenhouse effect, which is intensified by increased levels of heat-trapping gases like carbon dioxide (CO₂) and methane.
75. c) Decomposers (like bacteria and fungi) are essential for breaking down dead organisms and waste, returning vital nutrients to the ecosystem for use by producers.
76. c)
77. b) The endosperm is a nutrient-rich tissue found inside the seeds of most flowering plants. Its main role is to provide a food source for the developing plant embryo.
78. d)
79. d) From Unripe capsule of Papaver somniferum (poppy plant)
80. a)

Chemistry

81. a) Molar mass $2 \times 11.2 = 22.4$ g
Volume of 1 g compound at STP = $\frac{22.4}{22.4} = 1$ L
82. d) Equivalent mass of element = $\frac{\text{Mass of element}}{\text{Mass of oxygen}} \times 8 = \frac{53}{47} \times 8 = 9$
Atomic mass = Equivalent mass $\times$ Valency = $9 \times 3 = 27$ amu
83. b) This relationship is expressed as $r_n \propto n^2$.
84. d) For 4d electron, $n = 4$, $l = 2$, $m = -2$ or -1 or 0 or $+1$ or $+2$ and $s = +1/2$ or $-1/2$.
85. d) When an alpha particle is emitted, the parent nucleus loses 2 protons and 2 neutrons, which decreases the total number of neutrons relative to the number of protons, thereby increasing the n/p ratio.
86. d) At constant pressure the volume of a given mass of a gas increases or decreases by $1/273$ of its volume at 0°C for every degree rise or fall in temperature. $V_t = V_0 \left(1 + \frac{t}{273}\right)$
87. a) Water loving colloids are called as hydrophilic.
88. a) $\Delta S_{\text{vap}} = \frac{\Delta H_{\text{vap}}}{T} = \frac{540 \times 1000}{373} = 1447$ cal
89. d) Rate = $-\frac{1}{2} \frac{d[A_2]}{dt} = -\frac{d[B_2]}{dt} = \frac{1}{2} \frac{d[A_2B]}{dt}$.

90. d) If $E_a = 0$, the rate constant is independent of temperature, so there's no increase with rising temperature.
91. d) The value of equilibrium depends only on temperature.
92. a) $K_{sp} = S^2 = [1.1 \times 10^{-4}]^2 = 1.21 \times 10^{-8}$
93. c) O.N. of Mn in K_2MnO_4 is +6 (find O.N. of Mn in others).
94. c) geq of copper to be deposited is $\frac{127.08}{31.75} = 4$
1F deposits 1 geq, 4F will deposit 4 geq.
95. c) The rate constant doubles for 10°C rise in temperature.
For 20°C rise, the rate constant will be 4 times.
 $\therefore k_1 = 4k_2$ or, $k_2 = 0.25 K_1$
96. a) Milk is emulsion, liquid dispersed in liquid.
97. b) Efficiency of a fuel cell (η) = $\frac{\Delta G}{\Delta H}$
98. a) Calgon process is used to remove permanent hardness of water.
99. b) Cs^+ due to its very high ionic mobility has the highest conductivity.
100. d) $\text{Al}(\text{OH})_3$ is soluble in NaOH and $\text{Fe}(\text{OH})_3$ is insoluble.
Hence it can be separated by NaOH .
101. a) $\text{MgCl}_2 \cdot 6\text{H}_2\text{O} \xrightarrow{\Delta} \text{MgCl}_2 \cdot 2\text{H}_2\text{O} \xrightarrow{\Delta} \text{Mg}(\text{OH})\text{Cl} \longrightarrow \text{MgO} + \text{HCl}$
102. b) The mixture of MgCl_2 and MgO is known as sorel's cement.
103. a) The lower the mol. wt. the more is the volatile character.
104. a) Parke's process.
105. a) Gypsum is $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.
106. c) PF_5 has trigonal pyramidal shape in which axial and equatorial bonds have different lengths.
107. b) NCl_3 is explosive in nature.
108. a) $2\text{H}_2\text{S} + \text{O}_2 \rightarrow 2\text{H}_2\text{O} + 2\text{S}$
109. d) $\text{S}_2\text{O}_7^{2-}$ does not contain S - S bond as:

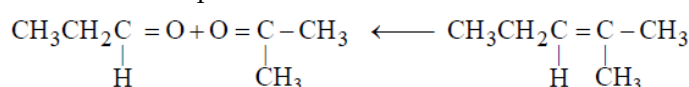


110. c) $\text{H}_2\text{S}_2\text{O}_7$ is Oleum.
111. d) Cl_2 will react with CaO , NaOH and KOH . It will not react with conc. H_2SO_4 hence can be dried over it.
112. d) Iron loses magnetic properties at 1000K .
113. b) Aniline is miscible in steam and has b.p. lower than water, hence it is collected as distillate along with steam.
114. a) 1-hydroxy -4- methyl -3- pentanone

$$\begin{array}{ccccccc} & & \text{CH}_3 & & \text{O} & & \\ & & | & & || & & \\ ^5\text{CH}_3 & - & ^4\text{CH} & - & ^3\text{C} & - & ^2\text{CH}_2 & - & ^1\text{CH}_2\text{OH} \end{array}$$
115. b) In benzene, the bond length between two carbons is equal.
116. b) The more substituted alkenes have greater number of hyperconjugated forms.
Hence they are more stable.

$$\begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ | \quad | \\ \text{H}_3\text{C} - \text{C} = \text{C} - \text{CH}_3 \end{array}$$

117. c) In trans-1, 2-dichloroethene, the chlorine atoms are on opposite sides of the double bond, causing their individual dipole moments to cancel each other out, resulting in a zero net dipole moment.
118. d) Optically active isomers that are not mirror images of each other are called diastereomers. This contrasts with enantiomers, which are stereoisomers that are non-superimposable mirror images of each other.
119. a) Successive alkanes differ by CH_2 group.
120. a) In such questions follow the following points:
 (i) write down the structure of the given carbonyl compound(s),
 (ii) remove oxygen atoms of the two carbonyl compounds,
 (iii) join the two carbon atoms of the two carbonyl groups to each other to get the structure of the parent alkene.



121. d) Addition of HBr on alkenes is an electrophilic reaction, hence more the number of electron-releasing groups on the double bond easier will be the addition.
122. a) Alkyl halides, on treatment with strong base like alc. KOH, undergo elimination reaction rather substitution reaction.
123. d) The conversion of ethyl alcohol to acetaldehyde is an example of oxidation.
124. d) Phenol has activating (electron-releasing) $-\text{OH}$ group and bromine water supplies Br^+ ion easily, hence under such conditions reaction does not stop at monobromo or dibromo- stage; but a fully brominated (2,4, 6-tribromophenol) compound is the final product.
125. d) Phenol has active (acidic) hydrogen so it reacts with CH_3MgI to give CH_4 , and not anisole
 $\text{C}_6\text{H}_5\text{OH} + \text{CH}_3\text{MgI} \longrightarrow \text{CH}_4 + \text{C}_6\text{H}_5\text{OMgI}$
126. c) Catalytic reduction, $\text{Na}/\text{C}_2\text{H}_5\text{OH}$ and LiAlH_4 reduce $>\text{C}=\text{O}$ group to $>\text{CHOH}$ and not $>\text{CH}_2$.
127. a) $\text{C}_6\text{H}_5\text{COC}_6\text{H}_5 + \text{KOH} \xrightarrow{\text{fusion}} \text{C}_6\text{H}_6 + \text{C}_6\text{H}_5\text{COO}^-\text{K}^+$
128. b)
- $$\begin{array}{c} \text{HCOONa} \\ + \\ \text{HCOONa} \end{array} \xrightarrow{\text{heat}} \begin{array}{c} \text{COONa} \\ | \\ \text{COONa} \end{array} + \text{H}_2$$
129. d) $\text{CH}_3\text{NC} \xrightarrow{\text{reduction}} \text{CH}_3 - \underset{\text{2}^\circ \text{ amine}}{\text{NH}} - \text{CH}_3$
130. b) Nylon is a synthetic polyamide polymer.

Physics

131. d)
132. b) Time average velocity = $\frac{v_1 + v_2 + v_3}{3} = \frac{3 + 4 + 5}{3} = 4\text{m/s}$
133. d) The stopping distance, $S \propto u^2$ ($\because v^2 = u^2 - 2as$)
 $\Rightarrow \frac{S_2}{S_1} = \left(\frac{u_2}{u_1}\right)^2 = \left(\frac{120}{60}\right)^2 = 4$
 $\Rightarrow S_2 = 4 \times S_1 = 4 \times 20 = 80\text{m}$

134. a) $x = \left(\frac{\mu}{\mu + 1} \right) l = \left(\frac{0.25}{0.25 + 1} \right) l = \frac{l}{5} = 20\% \text{ of } l$
135. a) $\frac{v_p}{v_e} = \sqrt{\frac{M_p}{M_e} \times \frac{R_e}{R_p}} = \sqrt{6 \times \frac{1}{2}} = \sqrt{3} \therefore v_p = \sqrt{3} v_e$
136. c) When an explosive shell travelling in a parabolic path under the effect of gravity explodes, the centre of mass of the fragments will move along the original parabolic path.
137. c) Power of a pump $= \frac{1}{2} \rho A v^3$
To get twice amount of water from same pipe v has to be made twice. So power is to be made 8 times
138. a) $\rho_A = 15 \quad \rho_B = 20 \quad m_A = x \quad m_B = 3x$
$$\rho_{\text{alloy}} = \frac{m_{\text{alloy}}}{V_{\text{alloy}}} = \frac{x + 3x}{\frac{x}{15} + \frac{3x}{20}} = 18.46$$
139. d) It is the specific property of a particular metal at a given temperature which can be changed only by temperature variations.
140. d) In the state of weightlessness or in gravity free space, water will rise to the upper end of the tube of any length.
141. d) Zero kelvin
 $= -273^\circ\text{C}$
(absolute temperature). As no matter can attain this temperature, hence temperature can never be negative on Kelvin scale.
142. c) When a copper ball is heated, its size increases. As Volume $\propto (\text{radius})^3$ and Area $\propto (\text{radius})^2$, so percentage increase will be largest in its volume. Density will decrease with rise in temperature
143. d) Temperature of mixture
$$\theta_{\text{max}} = \frac{m_1 c_1 \theta_1 + m_2 c_2 \theta_2}{m_1 c_1 + m_2 c_2} = \frac{m \times c \times 2T + \frac{m}{2} (2c)T}{m.c + \frac{1}{2} (2c)} = \frac{3}{2} T$$
144. c) $\Delta Q = \Delta U + \Delta W = 167 + 333 = 500 \text{ cal}$
145. c) In isothermal process temperature remains constant.
146. a) $\frac{E_1}{E_2} = \left(\frac{T_1}{T_2} \right)^4 \Rightarrow \frac{E}{E_2} = \left(\frac{273 + 0}{273 + 273} \right)^4 \Rightarrow E_2 = 16E$
147. a) $\omega = \frac{\mu_v - \mu_g}{\mu_\gamma - 1} = \frac{1.62 - 1.42}{1.5 - 1} = 0.4$
148. c) $v \propto \frac{1}{\mu} \Rightarrow \frac{v_1}{v_2} = \frac{\mu_2}{\mu_1} \Rightarrow \frac{v_g}{v_w} = \frac{\mu_w}{\mu_g} = \frac{4/3}{3/2} = \frac{8}{9}$
149. b) $0 = \sqrt{I_1 I_2} = \sqrt{4 \times 16} = 8 \text{ cm}$

150. d)
$$\frac{\delta_w}{d_a} = \frac{(w\mu_g - 1)}{(a\mu_g - 1)} = \frac{\left(\frac{9}{8} - 1\right)}{\left(\frac{3}{2} - 1\right)} = \frac{1}{4}$$

151. c)

$$\frac{I_{\max}}{I_{\min}} = \left(\frac{\sqrt{\frac{I_1}{I_2}} + 1}{\sqrt{\frac{I_1}{I_2}} - 1} \right)^2 = \left(\frac{\sqrt{\frac{25}{4}} + 1}{\sqrt{\frac{25}{4}} - 1} \right)^2 = \frac{49}{9}$$

152. a) Wavefront is the locus of all the particles which vibrates in the same phase.

153. d) The sounds of different source are said to differ in quality. The number of overtones and their relative intensities determines the quality of any musical sound.

154. c) After reflection from rigid support, a wave suffers a phase change of π

155. c)
$$n' = n \left(\frac{v + v_0}{v} \right) \Rightarrow 2n = n \left(\frac{v + v_0}{v} \right) \Rightarrow \frac{v + v_0}{v} = 2$$

$$\Rightarrow v_0 = v = 332 \text{ m/sec}$$

156. b) . The electric field intensity at the surface of a charged conductor is directed normally to the surface.

157. c)

158. c) In a charged capacitor the energy resides In the field between the plates.

159. d)
$$R \propto \frac{l^2}{m} \Rightarrow R_1 : R_2 : R_3 = \frac{l_1^2}{m_1} : \frac{l_2^2}{m_2} : \frac{l_3^2}{m_3}$$

$$\Rightarrow R_1 : R_2 : R_3 = \frac{9}{1} : \frac{4}{2} : \frac{1}{3} = 27 : 6 : 1$$

160. d) For conductors, resistance $\propto$ temperature and for semiconductor,

$$\text{resistance} \propto \frac{1}{\text{temperature}}$$

161. b)
$$V_2 - V_1 = E - ir = 5 - 2 \times 0.5 = 4 \text{ volt}$$

$$\Rightarrow V_2 = 4 + V_1 = 4 + 10 = 14 \text{ volt}$$

162. b) The sensitivity of potentiometer can be increased by decreasing the potential gradient i.e. by increasing the length of potentiometer wire.

$$(\text{Sensitivity} \propto \frac{1}{PG} \propto \text{Length})$$

163. c) Here $B = \mu_0 ni$

$$\text{Where } n \text{ is number of turns per unit length} = \frac{N}{l}$$

164. b) We have $qvB = \frac{mv^2}{r}$ or $r = \frac{mv}{qB} = \frac{\sqrt{2mK}}{qB}$
- For same kinetic energy K , we have $r \propto \sqrt{m}$. Hence path of proton will have larger r and is therefore less curved.
165. b) On heating, different domains have net magnetisation in them which are randomly distributes. Thus the net magnetisation of the substance due to various domains decreases to minimum.
166. d) Lenz's law is consequence of the law of conservation of Energy
167. c) Hot wire ammeter reads rms value of current.
- Hence its peak value $= i_{rms} \times \sqrt{2} = 14.14$ amp
168. c) Specific charge $= \frac{q}{m}$: Ratio $= \frac{\left(\frac{q}{m}\right)_a}{\left(\frac{q}{m}\right)_p} = \frac{q_a}{q_p} \times \frac{m_p}{m_a} = \frac{1}{2}$
169. c) According to de-Broglie hypothesis.
170. c) According to Einstein's photoelectric equation.
171. d) $W_0 = hv_0 \Rightarrow v_0 = \frac{W_0}{h} = \frac{2.5 \times 1.6 \times 10^{-19}}{6.6 \times 10^{-14}} = 6.08 \times 10^{14}$ cycle/sec
172. a) Hydrogen atom does not emit X-rays because its energy levels are too close to each other.
173. a) When cathode rays strike a metal target of high melting point with very high velocity, then X-rays are produced.
174. b) In unbiased condition of PN-junction, depletion region is generated which stops the movement of charge carriers.
175. c) For a wide range of values of load resistance, the current in the Zener diode may change but the voltage across it remains unaffected. Thus the output voltage across the Zener diode is a regulated voltage.
176. a) NOT gate is called as an inverter.
177. a) A logic gate is an electronic circuit which makes logic decisions
178. a) Hubble's law state that speed of recession (v) $\propto$ distance (r)
179. b) The energy of the sun is due to fusion of hydrogen nuclei into helium.
180. a) Mesons are made up of, One quark and antiquark.

MAT

181. a) Use option verification method, put the value of n as 1, 2, 3, 4, ...
182. c) Average always comes in centre if the data is in AP. So, $C = 48$ then $A = 46$ & $E = 50$. $A \times E = 2300$
183. a) $\frac{\text{Sum of positional value of Consonant}}{\text{Sum of positional value of Vowel}}$

184. d) $\frac{M_1 D_1}{W_1} = \frac{M_2 D_2}{W_2} \Rightarrow \frac{(100 \times 100)}{100} = \frac{4 \times x}{4} \Rightarrow x = 100$

185. b) $C_2 = C_1 \times C_3 - 6$

186. (b) Two-layer series, the pattern is +10,+18,+26,+34, ... then think this difference as new series where the pattern is +8,+8,+8,+8,+8, ...

187. b) E is repeated 2 times

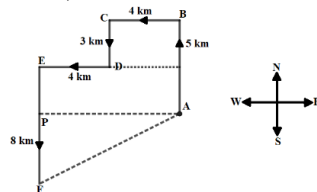
Total combinations = $\frac{(Total\ no.\ of\ alphabets)!}{(No.\ of\ repeated\ alphabets)!}$
 $= \frac{6!}{2!} = 360$

188. c)

189. b) Football and Bat are both sports equipment but related to different types of sports. On the other hand, Track refers to place/surface for running races, relay races which is different from Football and Bat.



190. c) Here, A denotes the starting point.



191. d) Here, 1st and 2nd alphabet interchange their position. 3rd alphabet remains same. The 4th and 5th alphabet also interchange their position to form the code. Thus, "AMONG" is the required code for "MANGO".

192. c) Let the weight of calf, goat and dog be 'C', 'G' and 'D' respectively.

$C - 5 = G$ (i)

$\frac{G}{2} = D$ (ii)

$C + D + G = 55$ (iii)

Solving these equations, $C = 25\ kg$

193. b) Girl's fathers only son-girl's brother, Grandmother of girl's brother-girl's grandmother, daughter in law of girl's grandmother-girls mother.

194. c) $x^3 + x: (x + 1)^3 + (x + 1)$

195. c) Think like Sequence as A, D, H, M similarly D, G, K, ?

196. d)

197. c)

198. c)

199. c)



200. b)

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