



CEE MODEL ENTRANCE EXAM

(SET-3 Solutions)

Instructions:

- There are 200 multiple-choice questions, each having four choices of which only one choice is correct.
- Fill (●) the most appropriate one.

Date : 2081/09/13
(Dec 28)

Duration : 3 hours
Time : 10 A.M. – 1 P.M.

1. a) Time of flight will be same as initial vertical velocity is zero for both.
2. d) When speed V is constant, the angular speed $\omega = \frac{V}{r}$ is constant
 \Rightarrow Angular acceleration $\alpha = \frac{d\omega}{dt} = 0$
3. a) Retardation; $a = \frac{u^2 - v^2}{2s} = \frac{(10)^2}{2 \times 7.0} = \frac{100}{14} = \frac{50}{7}$
 Also, retardation; $a = \mu_k g$
 $\therefore \mu_k g = \frac{50}{7} \Rightarrow \mu_k = \frac{50}{7 \times 10} \therefore \mu_k = 0.71$
4. b) $P = \sqrt{2mE_k} \propto \sqrt{m}$ [for same KE]
 So, heavier ball will have greater momentum.
5. b) $T^2 \propto r^3 \Rightarrow \frac{T_1}{T_2} = \left(\frac{r_1}{r_2}\right)^{3/2} = \left(\frac{10^{13}}{10^{12}}\right)^{3/2} = 10\sqrt{10}$
6. b) When man drops the masses, his moment of inertia decreases. As $J = I\omega = \text{constant} \Rightarrow \omega$ increases.
7. a) Pressure of liquid column $P = h\rho g$ i.e. independent of area.
8. a) The metal of a large thermal expansion, remains on outer side (convex-shaped) and bends towards the metal of low coefficient of thermal expansion.
9. c) Heat given by steam $= x \times 540 = 540x$
 Heat taken by ice $= mL + mc\Delta\theta = y \times 80 + y \times 1 \times 100 = 180y$
 $\therefore 540x = 180y \Rightarrow \frac{x}{y} = \frac{180}{540} = \frac{1}{3}$
10. b) From first law of thermodynamics, $dQ = dU + dW$
 Here, $dW = 0 \Rightarrow dU = dQ$
 As $dQ < 0 \Rightarrow dU < 0$
 For an ideal gas, $U \propto T$, so $dT < 0$ i.e. temperature of the gas decreases.

11. a)
12. a) Initial fundamental frequency of open pipe $n = \frac{V}{2l}$

$$\text{Frequency of closed organ pipe} = \frac{V}{4l}$$

$$\text{Third harmonic of closed pipe} = \frac{3V}{4l}$$

$$\text{Given, } \frac{3V}{4l} - \frac{V}{2l} = 100 \Rightarrow \frac{V}{2l} \left(\frac{3}{2} - 1\right) = 100$$

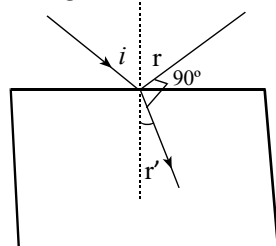
$$\therefore n = \frac{V}{2l} = 100 \times 2 = 200\text{Hz}$$

13. d) $n' = \frac{V + V_0}{V} n \Rightarrow n' = \frac{V + \frac{V}{5}}{V} n = \frac{6}{5} n \therefore \frac{n'}{n} = \frac{6}{5}$

$$\text{Now, \% increase in frequency } \frac{n' - n}{n} \times 100\%$$

$$= \left(\frac{n'}{n} - 1\right) \times 100\% = \left(\frac{6}{5} - 1\right) \times 100\% = 20\%$$

14. c) If angle of incidence is 'i' then from figure,



$$r' + 90^\circ + r = 180^\circ \Rightarrow r' = 180^\circ - 90^\circ - i \quad [\because i = r]$$

$$\text{So, angle of refraction } r' = (90^\circ - i)$$

$$\text{Now, } \mu = \frac{\sin i}{\sin r'} = \frac{\sin i}{\sin(90^\circ - i)} = \tan i \therefore i = \tan^{-1}(\mu)$$

15. d)
 16. b)
 17. a) When object is placed at $2f$ point on one side, a real image is formed at $2f$ point on other side. This is case of minimum separation which is $4f$.
 18. c)
 19. d) Potential of big drop = $n^{2/3} \times$ potential of a small drop
 $2.5V = (125)^{2/3} \times V = 25V \quad \therefore 1V = \frac{2.5}{25} V = 0.1V$
 20. d) Rate of disintegration of a fixed quantity of a radioactive sample remains unaffected by external conditions.
 21. b) Capacitances $C, 2C, 4C, 8C, 16C, 32C$ are in series so, equivalent capacitance

$$\frac{1}{C_{eq}} = \frac{1}{C} + \frac{1}{2C} + \frac{1}{4C} + \dots = \frac{1}{C} \left[1 + \frac{1}{2} + \frac{1}{4} + \dots \right]$$

$$= \frac{1}{C} \left[\frac{1}{1 - \frac{1}{2}} \right] = \frac{2}{C} \quad \therefore C_{eq} = \frac{C}{2}$$

 22. c) Aluminium is a metal and Germanium is semi-conductor. When cooled, resistance of aluminium decreases and that of germanium increases.
 23. c) Magnetic field at the centre due to either arm

$$B_1 = \frac{\mu_0}{4\pi} \times \frac{I}{\left(\frac{L}{2}\right)} [\sin 45^\circ + \sin 45^\circ] = \frac{\mu_0}{4\pi} \times \frac{2\sqrt{2} I}{L}$$

Field at the centre due to the four arms of the square,

$$B = 4B_1 = 4 \times \frac{\mu_0}{4\pi} \times \frac{2\sqrt{2} I}{L} \text{ i.e. } B \propto \frac{1}{L}$$

 24. a) The core of transformer is laminated as it breaks the path of eddy currents induced on the surface, thereby minimizing the losses by minimizing eddy current.
 25. a) $V = E + ir = 1.5 + 1 \times 0.5 = 2V$
 26. b) Material suitable for making electromagnets should have low retentivity and low coercivity. Soft iron is more suitable for making temporary magnets.
 27. d) As the inclined plane is smooth, the sphere can never roll, rather it will just slip down. Hence, the angular momentum remains conserved about any point on a line parallel to the inclined plane and passes through the centre of the ball.
 28. b) $g' = g \left[1 - \frac{2h}{R} \right] = g \left[1 - \frac{d}{R} \right]$
 $\frac{2h}{R} = \frac{d}{R} \Rightarrow d = 2h$
 29. a) In SHM velocity at any position y is given by $V = \omega \sqrt{A^2 - y^2}$
 So V will be maximum when $y^2 = \text{minimum} = 0$ i.e. $V_0 = A\omega$
 Given that, $y = \frac{A}{2}$ so $V = \omega \sqrt{A^2 - \left(\frac{A}{2}\right)^2}$ i.e. $V = \frac{\sqrt{3}}{2} A\omega = \frac{\sqrt{3}}{2} V_0$
 30. b) Here, $\theta = 30^\circ, E = 10^4 \text{ NC}^{-1}$
 $\tau = 9 \times 10^{-26} \text{ Nm}$
 As $\tau = pE \sin\theta \quad \therefore$ dipole moment,

$$P = \frac{\tau}{E \sin\theta} = \frac{9 \times 10^{-26}}{10^4 \times \sin 30^\circ} = \frac{9 \times 10^{-26}}{10^4 \times \frac{1}{2}} = 1.8 \times 10^{-29} \text{ cm}$$

 31. c) In both cases, volume of the wire is same; $V = Al = A'l'$
 $\frac{A}{A'} = \frac{l'}{l} = n \quad [\because l' = nl]$
 Now; $\frac{R'}{R} = \frac{\rho \frac{l'}{A'}}{\rho \frac{l}{A}} = \frac{l'}{l} \cdot \frac{A}{A'} = n \cdot n = n^2 \quad \therefore R' = n^2 R$
 32. b) $\alpha = \frac{NBA}{K} I \Rightarrow \alpha \propto N$

When the number of turns becomes half, the deflection for the same current will also becomes half the original deflection.

33. b) When the loops are brought nearer, magnetic flux linked with each loop increases. Thus the current will be induced in each loop in a direction opposite to its own current in order to oppose the increase in magnetic flux. This is in accordance with Lenz's law. So, the current will decrease in each loop.

34. b) Given that $E_0 = 10V$, $t = \frac{1}{600} s$ $\therefore E = E_0 \cos 2\pi ft$
 $= 10 \cos \left[2\pi \times 50 \times \frac{1}{600} \right] = 10 \cos \left(\frac{\pi}{6} \right) = 10 \left(\frac{\sqrt{3}}{2} \right) = 5\sqrt{3} V$

35. a) Diamagnetic material in a magnetic field moves from stronger to weaker parts of the field.

36. a) Red shift indicates shifting of spectrum towards longer wavelength and hence smaller frequency. It is so when stars/galaxies are moving away, i.e. universe is expanding.

37. d) Since the initial and final states are same, there would be no change in internal energy, i.e. $E = 0$. From the first law of thermodynamics, we have
 $Q = E + W \therefore Q = W \neq 0$

38. b) $V_{rms} = \sqrt{\frac{3RT}{M}} \Rightarrow V_{rms} \propto \sqrt{T}$

When temperature increased from 120 k to 480 k (i.e. 4 times), the root mean square speed will become $\sqrt{4}$ or 2 times, i.e. 2V.

39. d) In air, $d_a = ({}^a\mu_g - 1) A$
 In water, $d_w = ({}^w\mu_g - 1) A$

$$\text{So, } \frac{d_a}{d_w} = \frac{{}^a\mu_g - 1}{{}^w\mu_g - 1} = \frac{\frac{3}{2} - 1}{\frac{8}{3} - 1} = \frac{1}{2} \times 8 = 4 : 1 \left[\because {}^w\mu_g = \frac{\mu_g}{\mu_w} = \frac{3/2}{4/3} = \frac{9}{8} \right]$$

40. b) $V = 18kV = 18 \times 10^3V$; $m_e = 9 \times 10^{-31} \text{ kg}$
 $e = 1.6 \times 10^{-19}C$

If the electron strike the target with maximum speed (V_{max}) then we must have, $eV = \frac{1}{2} m_e V_{max}^2 \Rightarrow$

$$V_{max} = \sqrt{\frac{2eV}{m_e}}$$

$$\therefore V_{max} = \sqrt{\frac{2 \times 1.6 \times 10^{-19} \times 18 \times 10^3}{9 \times 10^{-31}}} = 8 \times 10^7 \text{ m/s}$$

41. b) $\lambda = \frac{h}{\sqrt{2mqV}}$; i.e. $\lambda \propto \frac{1}{\sqrt{mq}}$ $\therefore \frac{\lambda_\alpha}{\lambda_p} = \sqrt{\frac{m_p q_p}{m_\alpha q_\alpha}} = \sqrt{\frac{1}{4} \times \frac{1}{2}}$
 or, $\lambda_\alpha = \frac{\lambda_p}{2\sqrt{2}} = \frac{\lambda}{2\sqrt{2}}$

42. c)

43. a)

44. b) $\sin\theta > 1$ has no solution.

45. c) $\lambda_{min} = \frac{12400}{v} \text{ \AA} = \frac{12400}{15 \times 10^3} \times 10^{-10} \text{ m} = 0.82 \times 10^{-10} \text{ m}$

46. b)

47. b) $n = \frac{t}{T_{1/2}} = \frac{6400}{800} = 8$

$$\frac{N}{N_0} = \left(\frac{1}{2}\right)^n = \left(\frac{1}{2}\right)^8 = \frac{1}{256}$$

48. d) $E_{K_{max}} = hf - \phi_0$

The slope of the line in the graph is Planck's constant.

49. b)

50. c)

51. c) Sea weed ashes contains NaNO_3 . NaIO_3

52. b) $\text{Ag} + \text{Pb} + \text{O}_2 \xrightarrow{450^\circ\text{C}} \text{Ag} + \text{PbO}_2$
53. d) Al is a highly electropositive, which is extracted by electrometallurgy.
54. a) $\text{Li}_2\text{CO}_3 \xrightarrow{\Delta} \text{Li}_2\text{O} + \text{CO}_2$,
 Na_2CO_3 , K_2CO_3 and Rb_2CO_3 are thermally stable.
55. b) Tritium contains $1e^-$, $1p^+$ and $2n^0$
56. a) Breaking H_2 molecule into atomic hydrogen is endothermic change and formation of H_2 molecule from atomic hydrogen is exothermic change.
57. b) $\text{CO} + \text{H}_2$ gas is known as producer gas which is also known as synthesis gas or syngas.
58. b) After loses 1 electron from valence shell it acts as a inert gas electronic configuration like Ne.
59. d) $4\text{S} + 6\text{NaOH} \longrightarrow \text{Na}_2\text{S}_2\text{O}_3 + 2\text{Na}_2\text{S} + 3\text{H}_2\text{O}$
60. c) Another name of hydrogen cyanide is Prussic acid
61. d) According to the latest discoveries purest form of carbon is Fullerene. They do not have surface bonds that are to be attracted by other atoms as we see in the case of diamond and graphite.
62. d)
63. b) $\text{KNO}_3 \xrightarrow{\Delta} \text{KNO}_2 + \text{O}_2$
64. c) $\text{H}_2\text{S} + \text{SO}_2 \longrightarrow \text{H}_2\text{O} + \text{S} \downarrow$
65. (d)
- : $12.8 \text{ g of SO}_2 = \frac{22.4}{64} \times 12.8 = 4.48 \text{ L}$;
 $6.02 \times 10^{22} \text{ molecules of CH}_4 (0.1 \text{ mole}) = 2.24 \text{ L}$
 $0.5 \text{ mol of NO}_2 = 11.2 \text{ L}$;
 $1 \text{ g molecule of CO}_2 (1 \text{ mole}) = 22.4 \text{ L (Max. volume)}$
66. (c)
 $1 \text{ mL of water} = 1 \text{ g of water} (\text{H}_2\text{O} = 1 \text{ g mL}^{-1})$
 $\therefore 20 \text{ drops of H}_2\text{O} = 1 \text{ g}$
 $1 \text{ drop of H}_2\text{O} = \frac{1}{20} \text{ g} = 0.05 \text{ g} = \frac{0.05}{18} \text{ mole}$
 $= \frac{0.05}{18} \times 6.022 \times 10^{23} \text{ molecules}$
 $= 1.673 \times 10^{21} \text{ molecules}$
67. (d)
 Bohr's model goes against Heisenberg's uncertainty principle. Bohr's model gives concept of discrete orbits whereas according to Heisenberg exact position of electrons in the space about the nucleus cannot be known.
68. (b)
 Write the configuration of element with atomic number 105 and find out electrons with $n + \ell = 8$.
 There are 14 electrons in 5f-orbitals ($n + \ell = 5 + 3 = 8$) and 3 electrons in 6d-orbitals ($n + \ell = 6 + 2 = 8$) making total = 17.
69. (d)
 Both NH_3 and PH_3 are sp^3 hybridized and exhibit tetrahedral geometry.
70. (a)
- | Molecule | No. of unpaired electrons |
|----------|---------------------------|
| NO | 1 (paramagnetic) |

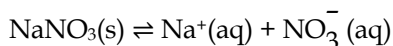
CO	Zero (diamagnetic)
O ₂	2 (paramagnetic)
B ₂	2 (paramagnetic)

71. (b)

The heat absorbed during isothermal expansion of an ideal gas against vacuum is zero.

72. (c)

For choice (c) i.e.,



ΔS° is positive as only in this process entropy of the system increases.

73. (c)

$$K_p = K_c (RT)^{\Delta n}$$

$$\text{Where } \Delta n = (\ell + m) - (x + y)$$

74. (b)

The salt with highest K_{sp} is most soluble. Thus, FeS will be most soluble.

75. (d)

Let solubility of AgCl in 0.01 M HCl = x mol L⁻¹

$$\therefore [\text{Ag}^+] = x \text{ mol L}^{-1}$$

$$[\text{Cl}^-] = [\text{HCl}] = 0.01 \text{ M} = 10^{-2} \text{ M}$$

[Cl⁻] from AgCl can be neglected]

$$K_{sp} = [\text{Ag}^+] [\text{Cl}^-]$$

$$1.8 \times 10^{-10} = x \times 10^{-2} \Rightarrow x = 1.8 \times 10^{-8}$$

76. (a)

MgCl₂ solution in water is acidic, therefore, its pH < 7.

77. (d)

According to Charle's law,

$$V_t = V_0 \left(\frac{273 + t}{273} \right) = V_0 \frac{283}{273}$$

78. (c)

In steam distillation, organic compound and water vaporise together. The mixture boils at a lower temperature (< 100°C) when the total vapour pressure becomes equal to atmospheric pressure.

Here, total pressure,

$$p = p(\text{water}) + p(\text{organic compound})$$

(Dalton's law of partial pressures)

79. (d)

$$\text{Total atoms in unit cell} = (8/8 + 8/1) = 9.$$

80. (d)

$$\text{Order of reaction} = \frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{6+4+3}{12} = \frac{13}{12}$$

81. (b)

$$[A] = \frac{[A_0]}{2^n}, \quad \therefore 1.25 = \frac{10\text{g}}{2^n}$$

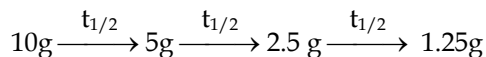
$$\text{or, } 2^n = \frac{10}{1.25} = 8 = 2^3$$

$$\therefore n = 3$$

i.e., 3 half lives = 12 years

$$t_{1/2} = 12/3 = 4 \text{ years}$$

Alternately,

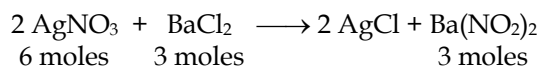


$$3 \times t_{1/2} = 12 \text{ years or } t_{1/2} = 4 \text{ years}$$

82. (b)

2L of 3M AgNO_3 = 6 moles of AgNO_3

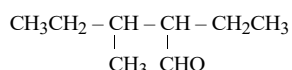
3L of 1M BaCl_2 = 3 moles of BaCl_2



Thus 6 moles of NO_3^- [$\text{Ba(NO}_3)_2$] ions are present in $2 + 3 = 5\text{L}$

$$\text{Hence, molarity} = \frac{\text{No. of moles}}{\text{Vol. of solution in litres}} = \frac{6}{5} = 1.2$$

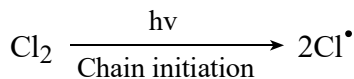
83. c) 2-ethyl-3-methylpentanal is the IUPAC name of



84. d) BF_3 being electron deficient compound acts as electrophile.

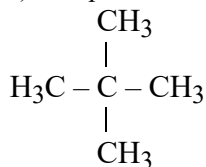
85. a) Br is substituted by NH_2 .

86. b) $\text{CH}_3\text{-S-C}_3\text{H}_7$ and $\text{C}_2\text{H}_5\text{-S-C}_2\text{H}_5$ are metamers.

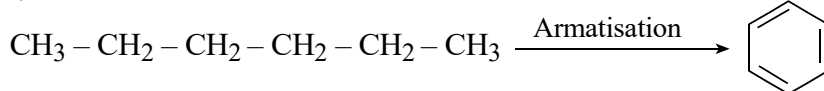


87. a)

88. d) Neo-pentane has only 1° hydrogen and hence gives only one monochloro derivative.



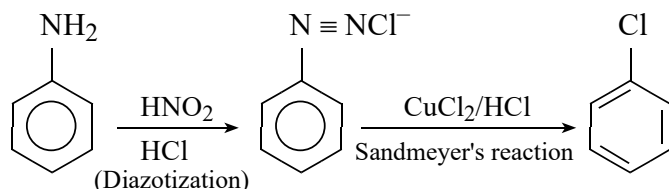
89. b)



Benzene

90. b) Methane reacts with steam at 1273 K in the presence of nickel catalyst to form carbon monoxide and dihydrogen. This method is used for industrial preparation of dihydrogen gas.

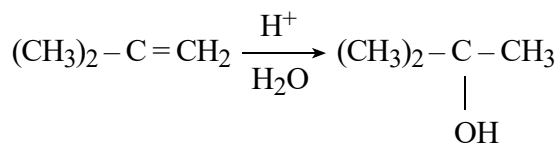
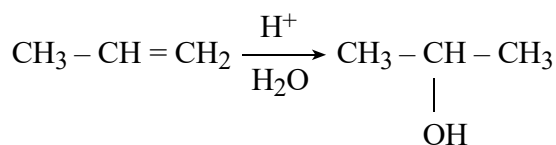
91. c)



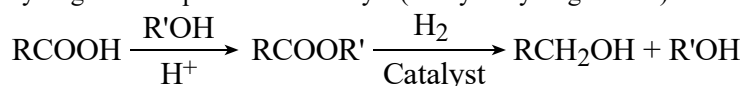
92. d) Except (d) all contain abstractable proton.

93. b) Freon-12 is commonly used as refrigerant.

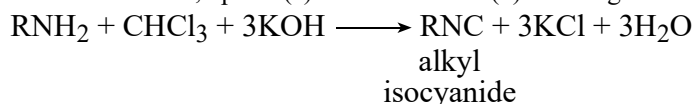
94. b) Acid catalysed hydration of alkenes except ethene leads to the formation of secondary or tertiary alcohol. To obtain primary alcohol, hydroboration oxidation is used.



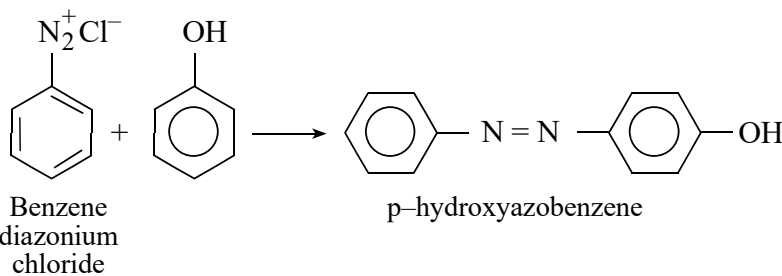
95. a) Commercially, acids are reduced to alcohols by converting them to the esters, followed by their reduction using hydrogen in the presence of catalyst (catalytic hydrogenation).



96. c) CH_3OCH_3 and $\text{C}_2\text{H}_5\text{OCH}_3$ are gases while $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$ (b. p. 308 K) is low boiling liquid.
 97. a) Any primary amine means both aliphatic as well as aromatic but monoalkylamines means only 1° aliphatic amines. Therefore, option (a) is correct while (d) is wrong.



98. a) Azo dye is prepared by diazo coupling reaction of phenol with diazonium salt.



(-N=N-) group is called azo - group.

99. b)
 When benzyl alcohol is oxidised with KMnO_4 , benzoic acid is the result.
100. a)
101. d) Abiogenesis theory, Biogenesis theory and Miller and Urey. Oparin and Halden supports to organic evidences.
102. b) Abiogenesis theory was disproved by F. Redi but on the basis of boiled material, abiogenesis was disproved by L. Pasteur.
103. d) All given options are living fossil but Ginkgo is oldest living fossil that belongs to Gymnosperms.
104. c)
 a. Paleolithic- age of tools weapons and war.
 b. Mesolithic- age of animal husbandry.
 c. Neolithic- age of agriculture.
 d. Bronze /Iron age- Recent age
105. a) *Amoeba*, *Euglena* have contractile vacuoles, *Paramecium* has contractile vacuole with radiator canal and *E. histolytica* has no contractile vacuole
106. c) Neuro motor system only appears in *Paramecium* by synchronous and metachronous ciliary movement.
107. c) Carmine particle release out through osculum.

108. c) Food digestion takes place in Hydra by Endotheliogland cells – they inter-spread among their nutritive muscle cells, believed to be developed from interstitial cells and lodge symbiotic algae. They are of two types:
- enzymatic gland cells – secrete digestive enzyme-in coelenterons.
 - Mucous gland cells – secrete mucus for paralyzing prey-in hypostome region.
109. b) Corallium is commonly called red coral (Muga)
110. b) Laurer's canal is found in Fasciola that extends from ovi duct.
111. a)
112. c) *Bonellia* feeds with the help of Proboscis
113. b)
- Plasmodium vivax* -schuffener's dot
 - Plasmodium malariae*- Ziemer's dot
 - Plasmodium falciparum*- mauerer's dot
 - Plasmodium ovale*- Jame's dot
114. d) Haemozoin is formed by degradation of haemoglobin that is malarial granules and causes chill-chill fever.
115. b) Annelids include a thin chitinous cuticle covering their bodies, but as in arthropods, it is not as well formed. Because the cuticle is albuminoid rather than chitinoid, free gas exchange is possible. The body wall may contain minute chitinous setae.
116. d)
117. b)
- Respiration -chorion
 - Excretion - allantois
 - Protection – all membranes
 - Nutrition –yolk sac
118. b)
- Lingual and mandibular –External jugular
 - Internal jugular and sub-scapular -innominatum
 - Brachial and musculocutaneous –sub scapular
119. b) Bidder's canal of frog is present in kidney but it is related to function of testis because Bidder's canal is formed by union of vasa efferentia.
120. d) on the basis of histology and distribution of villi human placenta is haemochorial and metadiscoidal.
121. b) Riboflavin has Zn^{++}
122. d)
- Minigastrin / G14 -> 14 amino acid
Gastrin / G17 -> 17 amino acid
Big gastrin / G34 -> 34 amino acid
Pentagastrin – used for gastric function test.
123. c) water absorption occurs in stomach, jejunum, ileum and colon but due to E.coli and Haustra more water absorption occurs in colon.
124. a) Increased H^+ , increased CO_2 and increased temperature.
125. c) Pseudostratified epithelium tissue is divided into two types. They columnar pseudostratified epithelia and ciliated columnar epithelia tissue. Male urethra is lined by columnar pseudostratified while ciliated columnar pseudostratified lines trachea.

126. b) amino acid and glucose 100%
127. b) This closing of auriculoventricular valves at the start of ventricular systole produces first heart sound called "Lub" or systolic sound. This rapid closure of semilunar valves at the beginning of ventricular diastole produces the second heart sound called dup or diastolic sound. It is less loudly and for less periodic than systolic sound.
128. b)
129. a)
Pre-frontal cortex- short term memory
cerebellum- skilled memory
hippocampus of temporal lobe- long term memory.
130. b) Penile erection is mainly achieved by parasympathetic activity that relaxes smooth muscles of corpora, causes vasodilation and increases blood flow to the corporal interstices
131. a)
132. b)
133. a)
134. a)
135. c)
136. b)
137. d)
- Nutritional Anaemia: It is due to deficiency of iron in food. It is also known as Hypochromic anaemia.
 - Pernicious Anaemia: It is non-genetic anaemic. It is due to vitamin B12. In this type of anaemia number of RBC decrease and size of RBC increase but Hb content is less in R.B.C.
 - Macrocytic Anaemia: It is also known as megaloblastic anaemia. It is due to deficiency of folic acid in food.
 - Sickle Shaped Anaemia: It is genetic and RBC becomes sickle shaped.
 - Thalassemia: It is also genetic. It is due to recessive gene. In this type body does not make Hb or RBC.
 - Aplastic Anaemia: It is due to failure of RBC formation in bone marrow. It is non-genetic. It is due to damage in bone marrow or by drug reaction in bone marrow.
 - Haemolytic Anaemia: It is due to more destruction of RBC by certain agent. e.g. snake venom and Plasmodium.
 - Haemorrhagin in Anaemia: It is due to excessive bleeding.
 - Septicemia: It is a sort of blood poisoning.
138. b)
139. b)
- Klinotaxis
- Movement in which animals try to orient their body by comparing the intensities of stimulation on two sides of the body, by bending right and left in response to stimulus until the receptors of two sides are equally stimulated is known as Klinotaxis. E.g. Euglena, Planaria, Earthworm
 - Shown by organisms that bear sensory receptors but no sense organs.
- Tropotaxis
- Behavioral response of bilaterally symmetrical animals due to stimulus leading to orientation of the body straight towards the stimulus is k/a tropotaxis.

- Argulus (fish louse), planaria or grayling butterflies always orient towards the sun by turning to that position in which both their eyes are equally stimulated. If one of their eyes is made blind, they move in a circle.
Telotaxis
 - If two sources of stimuli of same intensity operates at the same time, the bilaterally symmetrical animals will orient at any one of the stimuli but not intermediate of both. It is k/a Telotaxis.
 - For e.g. honey bees going for foraging in the morning.
Menotaxis
 - Orientation of the body in response to stimulus at a constant angle is k/a menotaxis.
 - Menotaxis is also known as "Light compass response"
 - Exhibited by insect like ants and honeybee.
140. b)
- a. IgA- It is also called secretory antibody. It is present on mucosal surfaces and body secretions like saliva and milk (10%)
 - b. IgM- It is first antibody to be synthesis by foetus of 5 months. Presence of this antibody in new born child indicates the infection like congenital syphilis (5%)
 - c. IgE- It is also called allergic antibody it attach to mast cell and causes increased secretion of histamine so it stimulates the allergic phenomenon
 - d. IgG- It provides passive immunity to the foetus by crossing placental barrier. Only maternal Ig that can cross the placental barrier and provide natural passive immunity to foetus
141. a) Smooth ER is responsible for lipid synthesis. Rough ER is responsible for protein synthesis. Golgi apparatus helps in formation of cell membrane and lysosome. Centrosome helps in spindle fiber formation.
142. a) Acrosome is formed by the fusion of pro-acrosomal vesicles derived from the trans-Golgi network.
143. a) Aleurone layer in maize stores protein. Amylo word is related to starch.
144. a) Actin protein is found in microfilament. They are composed of mainly the actin protein and have a contractile association with filamentous protein, myosin which is essential for the contraction of microfilaments.
145. a) Shape is determined at anaphase . Metaphasic plates are formed at metaphase and chromosomes are separated at telophase.
146. a) Prophase I includes the pairing of homologous chromosomes and crossing over. Anaphase I and anaphase II include separation and movement of homologous chromosomes and sister chromatids to opposite poles respectively. Prophase II is marked by condensation of chromatin material. Homologous chromosomes align themselves at cell's equator during metaphase I. Thus, the correct answer is option a.
147. c) Casein is milk protein which provides body with all necessary amino acids to help build muscle as Lactose is milk sugar. Myosin is muscle protein. Pepsin is found in stomach which digests protein.
148. c) Virus acts as living only in living organism and acts as non-living outside living organism so called obligate parasite.
149. a) Amphitrichous - Two flagella; one on each end.
Lophotrichous- Group of flagella; all at one end.
Monotrichous- Single flagella.
Peritrichous - Flagella throughout the periphery of organism.

150. a) Genetic transfer through viruses in bacteria is called transduction. **Translation:** Process of synthesis of protein from ribosome. **Transcription:** Synthesis of RNA from DNA. **Transportation:** shifting of goods from one place to another.
151. a) Flagellin protein is found in flagella of bacteria. Remaining options are related to protein found in connective tissue of human.
152. a) Female cone of gymnosperm represents inflorescence. Ovary is differentiated into true fruit after maturation. Ovule changes into seeds. Female gametes are produced from megaspores.
153. c) Snake of plant kingdom is Pteridophytes. Amphibians of plant Kingdom is Bryophytes.
154. a) Lichen: bio indicator of SO₂ pollution. Bryophytes: bio-indicator of Soil pollution.
155. a) Secondary meristem develops from primary permanent tissue. Primary Permanent tissue is developed from primary meristem. Secondary permanent tissue is developed from secondary meristem.
156. b) Flowering hormone is commonly called as florigen. Ethylene is used for ripening of fruit & Gibberellin is used for elongation of dwarf plant. Both ethylene & gibberellin are phytohormones. Adrenaline is found in human.
157. a) Bulliform cells helps in folding and unfolding of leaves. Epidermis is outermost protective layer in which bulliform cells are present. Spongy cells help in buoyancy and mesophyll cells help in photosynthesis.
158. d) Diffusion is the movement of anything from higher concentration to its lower concentration. Hormones are distributed by diffusion.
159. d) Osmosis is the net movement of solvent and imbibition is the first step of osmosis. Adsorption of water occur in imbibition as in seed germination, swelling of wood door in rainy season.
160. a) In cyclic photophosphorylation of light reaction, ATP is produced but in non-cyclic, ATP and NADPH₂ both are produced. So, light reaction produces both ATP & NADPH₂.
161. a) Gibberellin stimulates flowering in long day plants. Cytokinin stimulates flowering in short day plants.
162. c) Respiration occurs in mesosome in bacteria. Aerobic respiration occurs in mitochondria & anaerobic respiration occurs in cytoplasm.
163. a) 1st step is excitation of electrons; 2nd step is release of O₂ by photolysis and 3rd step is reduction of CO₂ in photosynthesis.
164. a) Crossing over is exchange of genetic material between two non-sister chromatids of homologous chromosome. It occurs in pachytene stage of prophase I.
165. b) Inheritance from father to grandson through daughter is crisscross inheritance and particularly called diagnic & if crisscross inheritance is from mother to granddaughter through son is called diandric.
166. c) 44 + XO → Turner's Syndrome, 44+XX → female, 44+XY → Normal male, 44+ XXX → Klienfilter Syndrome.
167. a) Frederick Griffith → Transformation experiment. Linus Pauling discovered cause of sickle cell anemia. Messelson & Stahl discovered DNA replication was semi conservative. Watson & Crick discovered double helix model of DNA.
168. a) Sugar + Nitrogenous base → Nucleoside and Nucleoside + Phosphate → Nucleotide
169. c) mRNA → largest RNA. tRNA is smallest RNA.
170. d) Endosperm of angiosperm is triploid and that of gymnosperm is haploid because endosperm is formed after fertilization in angiosperm and before fertilization in Gymnosperm.
171. d) Cleistogamy is phenomenon that occurs in bisexual flower that never remains open. Chasmogamy → open petal & exposed reproductive part helps in cross pollination. Xenogamy → Pollination in different plants.

- 172. c) Virus free plants are obtained from the shoot tip culture because tip of shoot contains meristematic tissue which has high power of division.
- 173. d) Pure line → homogenous line of descent. Gene pool → stock of different genes in an interbreeding population. Gene drift → change in frequency of gene variant in population Evolutionary line → Genes connected by continuous line of descent from ancestor to descendant.
- 174. b) Heterosis is the superiority of hybrid over parent in F₁ hybrid. Dominant in the parental character.
- 175. d) The species which contribute in the ecosystem is known as Keystone species.
- 176. c) CFC → Chlorofluorocarbon is the chief constituent for ozone layer depletion. CO₂ is greenhouse gas. N₂ is required for plant and is the mostly present gas in the atmosphere (78%).
- 177. a) Pneumatophores are the negatively geotropic root for aeration in the marshy or saline area.
- 178. a) Sucker is the aerial modification of stem which are also used for Perennation.
- 179. d) *Tagetes patula* is marigold flower which falls in the family Asteraceae or Compositeae. Both are same.
- 180. d) Single cotyledon of monocot is known as scutellum. Plumule is the upward growing part at germination which grows into stem. Mesocotyl is an elongated portion of the axis between the cotyledon and the coleoptile of a grass seedling.

- 181. b)
- 182. d)

$$\frac{A}{1} \frac{BB}{2} \frac{CCC}{3} \frac{DDDD}{4}$$

The first alphabet is written once, the second is written twice and the nth letter is written n times.

Thus, the number of letters written up to the nth letter is equal to the sum of the first 'n' natural numbers

given by $\frac{n(n+1)}{2}$.

Since the 100th letter of the series is to be found out, we should select the value of n such that the sum is either 100 or just less than 100.

Taking n=13, we have $\frac{13 \times (13 + 1)}{2} = 91$

Taking n = 14, we have $\frac{14 \times (14 + 1)}{2} = 105$

This means that the series contains 91 letters in all for the letter corresponding to n = 13 and 105 letters in all for the letter corresponding to n = 14.

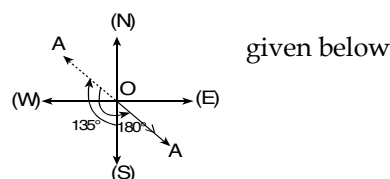
Thus, letter corresponding to n = 14 will be the letter occupying the 92nd to 105th place in series. But n = 14 corresponding to the letter N. So, 100th letter in series is N.

- 183. d) All are different entities Iron Lead Nitrogen

- 184. c) S is the aunt of T means S is the sister of the father of T, i.e., S × M + T

- 185. c) Gita's rank from the last = 42 - 26 + 1 = 17
∴ Bharati's rank from the last = 17 + 8 = 25

- 186. c) According to the question, the direction diagram is as



- 187. d) Here, $\frac{363}{7} = 51 \text{ weeks} + 6 \text{ odd days}$
∴ Thursday + 6 days = Wednesday

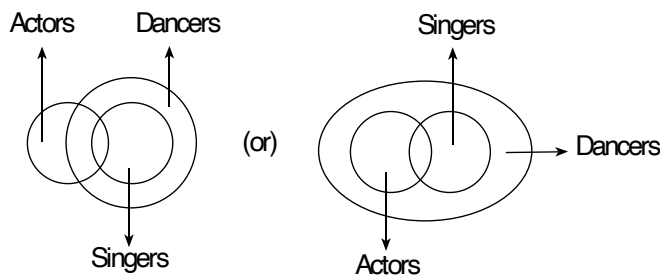
188. b)
 $\begin{matrix} \bullet & \bullet & \bullet & \bullet & \bullet \\ E & B & A & C & D \end{matrix}$

Therefore, A is sitting in between B and C.

189. a)
 $16 \div 8 \times 6 - 2 + 12$

Replacing the signs, $16 + 8 - 6 \times 2 \div 12 = 16 + 8 - \frac{6 \times 2}{12} = 16 + 8 - 1 = 24 - 1 = 23$

190. a)



Only (1) follows

191. d)
 Let, C's age be x years. Then, B's age = $2x$ years.
 A's age = $(2x + 2)$ years
 $\therefore (2x + 2) + 2x + x = 27$
 $\Rightarrow 5x = 25 \Rightarrow x = 5$
 Hence, B's age = $2x = 10$ years.

192. a)
 Required average = $\frac{11 + 22 + 33 + \dots + 99}{9} = \frac{11(1 + 2 + 3 + \dots + 9)}{9} = \frac{11}{9} \times \frac{9(9 + 1)}{2} = 55$.

193. d)
 $(A + B)$'s 20 day's work = $\left(\frac{1}{30} \times 20\right) = \frac{2}{3}$
 Remaining work = $\left(1 - \frac{2}{3}\right) = \frac{1}{3}$
 Now, $\frac{1}{3}$ work is done by A in 20 days.

Therefore, the whole work will be done by A in $(20 \times 3) = 60$ days.

194. c)
 $7 \times 3 : 9 \times 3 : 9 \times 5 = 21 : 27 : 45 = 7 : 9 : 15$

195. a)
 B's salary is more than that of A by $\frac{R}{100 - R} \times 100\% = \frac{25}{100 - 25} \times 100\% = 33\frac{1}{3}\%$.

196. a)

Let AB be the tower and C and D be the objects.

Then, $AB = 150$ m, $\angle ACB = 45^\circ$ and $\angle ADB = 60^\circ$

$$\frac{AB}{AD} = \tan 60^\circ = \sqrt{3}$$

$$\Rightarrow AD = \frac{AB}{\sqrt{3}} = \frac{150}{\sqrt{3}} \text{ m}$$

$$\frac{AB}{AC} = \tan 45^\circ = 1$$

$$\Rightarrow AC = AB = 150 \text{ m}$$

$$\therefore CD = (AC - AD)$$

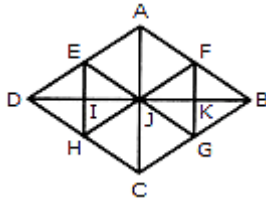
$$= \left[150 - \frac{150}{\sqrt{3}} \right] \text{ m} = \left[\frac{150(\sqrt{3} - 1)}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} \right] \text{ m}$$

$$= 50(3 - \sqrt{3}) \text{ m} = (50 \times 1.27) \text{ m} = 63.5 \text{ m}$$

197. b)

The figure gets rotated through 180° .

198. c)



The simplest triangles are AFJ, FJK, FKB, BKG, JKG, JGC, HJC, HIJ, DIH, DEL, EIJ and AEJ, i.e., 12 in number.

The triangles are composed of two components each JFB, FBG, BJG, JFG, DEJ, EJH, DJH and DEH, i.e., 8 in number.

The triangles are composed of three components each AJB, JBC, DJC and ADJ, i.e., 4 in number.

The triangles are composed of six components each DAB, ABC, BCD and ADC, i.e., 4 in number.

Thus, there are $12 + 8 + 4 + 4 = 28$ triangles in the figure.

199. d)



200. b)