



CEE MODEL ENTRANCE EXAM

(SET-8 Solutions)

Instructions:

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

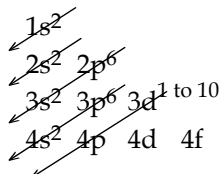
Date : 2081/10/19
(Feb 01)

Duration : 3 hours
Time : 7 A.M. – 10 A.M.

1. (d) Mol. wt. of sugar ($C_{12}H_{22}O_{11}$) = $12 \times 12 + 22 \times 1 + 11 \times 16$
 = $144 + 22 + 176$
 = 342 g
 342 g of sugar contains 6.023×10^{23} no. of sugar molecules ($C_{12}H_{22}O_{11}$)
 = $12 \times 6.023 \times 10^{23}$ cations + $22 \times 6.023 \times 10^{23}$ H atoms + $11 \times 6.023 \times 10^{23}$
 = $45 \times 6.023 \times 10^{23}$ atoms
 = 2.71×10^{25} atoms

2. (b)
- | | |
|---|---|
| $V_1 = ?$
$N_1 = 1M \text{ NaOH} = 1N \text{ NaOH}$
$V_2 = 50 \text{ ml}$
$N_2 = 1M \text{ H}_3\text{PO}_3 = 2N \text{ H}_3\text{PO}_3$
$V_1N_1 = V_2N_2$
$V_1 \times 1 = 50 \times 2$
$V_1 = 100 \text{ ml of H}_3\text{PO}_3$ | $V_1 = ?$
$N_1 = 1M \text{ NaOH} = 1N \text{ NaOH}$
$V_2 = 100 \text{ ml}$
$N_2 = 2M \text{ H}_3\text{PO}_2 = 2N \text{ H}_3\text{PO}_2$
$V_1N_1 = V_2N_2$
$V_1 \times 1 = 100 \times 2$
$V_1 = 200 \text{ ml of H}_3\text{PO}_2$ |
|---|---|

3. (b) Number of neutrons = At. mass - At. number
 = $88 - 38 = 50$
4. (c) Electric configuration = $1s^2 2s^2 2p^6 3s^2$
5. (d) 3d-transition elements are from at no. 21-30 and their electronic configuration is



6. (c) N_2O , NO , CO and H_2O are non-metallic neutral oxide having lower oxidation state.
 7. (a) Cl - has highest electron affinity
 Cs - has lowest electron affinity in periodic table
 8. (b) $RbCl$ is diatomic molecule and other given molecules are polyatomic.

9. (d) $V_1 = 2 \text{ L}$
 $T_1 = (35 + 273)K = 308K$
 $V_2 = ?$
 $T_2 = (45 + 273)K = 318K$
 $\frac{V_1}{T_1} = \frac{V_2}{T_2}$
 $\frac{2}{308} = \frac{V_2}{318}$
 $V_2 = \frac{2 \times 318}{308} = 2.064 \text{ L}$

The volume of air will escape = $2.064 - 2.000 = 0.064 \text{ L} \approx 64 \text{ ml} \approx 60 \text{ ml}$

10. (b) Only heat exchange between system and surrounding but no matter exchange.
 11. (b) Given reaction is exothermic reaction and in forward direction 3 vol. of reactants reacts to each other to form 2 vol. of products. So low temperature and high pressure is favorable.
 12. (d) Oxidation state of Mn in MnO_4^- is +7 and in Mn^{2+} is +2. The change in O.N. of $Mn = +7 - (+2) = +5$.

13. (a) $MX_4 \rightleftharpoons M^{4+} + 4X^-$
- | | | |
|---|-----|------|
| S | 'S' | '4S' |
| $K_{sp} \text{ of } MX_4 = S \times (4S)^4$ | | |
| = $S \times 256 S^4$ | | |
| = $256 S^5$ | | |

14. (a)
-

15. (c)
 16. (b) Total number of spectral lines emitted from higher excited state to ground state

$$= \frac{n(n-1)}{2}$$

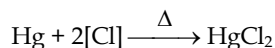
$$= \frac{4 \times (4-1)}{2} = \frac{2 \times 3}{1} = 6$$

17. (b) Each atom is associated with two tetrahedral holes.

18. (c) $ECE (Z) = \frac{E}{F} = g/\text{coulomb}$

19. (c) $(\text{NH}_4)_2 \text{Cr}_2\text{O}_7 \xrightarrow{\Delta} \text{N}_2 + \text{Cr}_2\text{O}_3 + 4\text{H}_2\text{O}$

20. (b) $3\text{HCl} + \text{HNO}_3 \longrightarrow \text{NOCl} + 2\text{H}_2\text{O} + [\text{Cl}]$
 Concⁿ Concⁿ



21. (d) Blister copper contains (1 - 2)% of impurities.

22. (c)

23. (c)

24. (c) The NO_2^- ion ($-\text{O} - \overset{\bullet\bullet}{\text{N}} = \text{O}$) has two donor atoms i.e., N and O.

25. (c)

26. (b) $2\text{NaOH} + \text{Zn}(\text{OH})_2 \longrightarrow \text{Na}_2\text{ZnO}_2 + 2\text{H}_2\text{O}$

Base Acid Salt Water

Na_2ZnO_2 is basic salt, which gets anionic hydrolysis.

27. (a)

28. (d) $\text{Cl}_2 + 2\text{KI} \longrightarrow 2\text{KCl} + \text{I}_2$

$\text{I}_2 + \text{starch} \longrightarrow \text{starch iodide}$ (deep blue colouration)

29. (a)

30. (a) According to MOT, O_2 molecule has two unpaired electrons.

31. (b)

32. (c)

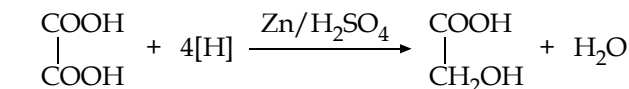
33. (d)

34. (d) Tollen's reagent, Fehling solution and Schiff's reagent behave similarly with formaldehyde and acetaldehyde; while caustic soda solution reacts in different ways.

35. (d) Any substituent in the carbonyl compound that increases the positive charge on the carbonyl carbon will increase reactivity towards nucleophilic addition. Thus compound (d) is most reactive due to - M effect of the - NO_2 group.

36. (b) Consider butanoic acid, $\text{C}_3\text{H}_7\text{COOH}$, i.e. $\text{C}_4\text{H}_8\text{O}_2$ or $\text{C}_n\text{H}_{2n}\text{O}_2$

37. (c)

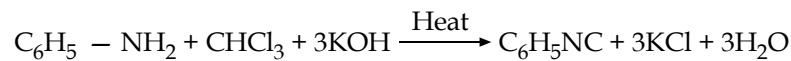


Oxalic acid

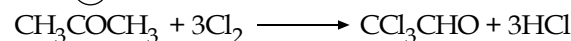
Glycollic acid

38. (c)

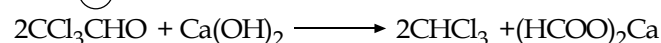
39. (c)



(A)



(Z)



(Y)

40. (b) Different foods contain different acids. Acid present in lemons and oranges is citric acid.

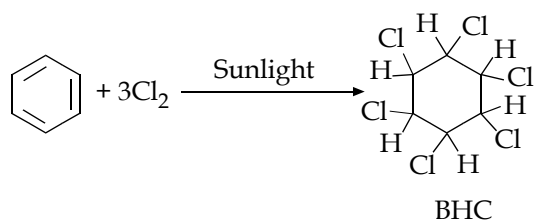
41. (b)

42. (a)

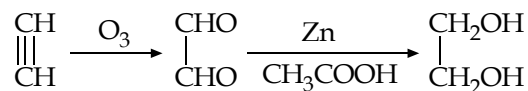
43. (d)

44. (b)

45. (c) In the presence of sunlight, Cl_2 undergoes free radical addition on benzene rather than electrophilic substitution.



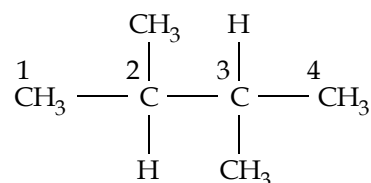
46. (c)



47. (b) Grignard reagent forms hydrocarbon when treated with compound containing active hydrogen atom, viz $\text{CH}_3\text{CH}_2\text{OH}$. Note that CH_3CHO , CH_3COCH_3 and $\text{CH}_3\text{COOCH}_3$ do not contain active hydrogen atom (a hydrogen atom attached to electronegative element like O, N and S is called active).

48. (a)

49. (d)



2, 3 - Dimethylbutane

2 and 3 number of carbons are tertiary carbon and other carbon are primary carbon.

50. (c) Azeotropic distillation is defined as the separation of all the azeotropic mixture by the process of distillation.

51. (a): Here, $A = 10$ dyne, $B = 10$ dyne, $\theta = 180^\circ - 60^\circ = 120^\circ$

$$\begin{aligned} R &= \sqrt{A^2 + B^2 + 2AB \cos \theta} \\ &= \sqrt{10^2 + 10^2 + 2 \times 10 \times 10 \cos 120^\circ} \\ &= \sqrt{100 + 100 - 2 \times 10 \times 10 \times 1/2} \\ &= \mathbf{10 \text{ dyne}} \end{aligned}$$

52. (b): Refer to Fig., let velocity of rain be,

$$\vec{v}_r = a\hat{i} + b\hat{j}$$

1st case, velocity of girl,

$$\vec{v}_g = (5 \text{ ms}^{-1})\hat{i}$$

velocity of rain w.r.t. girl,

$$\begin{aligned} \vec{v}_{rg} &= \vec{v}_r - \vec{v}_g = (a\hat{i} + b\hat{j}) - 5\hat{i} \\ &= (a - 5)\hat{i} + b\hat{j} \end{aligned}$$

Since rain appears to fall vertically downward, so, $a - 5 = 0$ or $a = 5$

2nd case, $\vec{v}_g = (10 \text{ ms}^{-1})\hat{i}$. Therefore, $\vec{v}_{rg} = \vec{v}_r - 10\hat{i} = (a\hat{i} + b\hat{j}) - 10\hat{i} = (a - 10)\hat{i} + b\hat{j}$

Since rain appears to fall at 45° to the vertical, so $\tan 45^\circ = \frac{b}{a - 10} = \frac{b}{5 - 10} = \frac{b}{-5}$ or $1 = \frac{b}{-5}$ or $b = -5$

Hence, $\vec{v}_r = 5\hat{i} - 5\hat{j}$ and $|\vec{v}_r| = \sqrt{5^2 + (-5)^2} = 5\sqrt{2} \text{ ms}^{-1}$

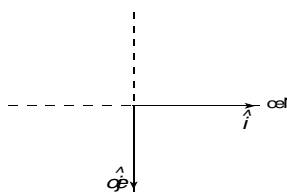
53. (a): Angular momentum = momentum \times perpendicular distance. Perpendicular distance is zero when projectile is at the starting point. Hence, angular momentum is minimum **at the starting point**.

54. (a): As ends P and Q fall down with velocity u , the length l decreases at the rate of u m/s.

From Fig., $l^2 = b^2 + y^2$

Differentiating w.r.t. time, we get

$$2l \times \frac{dl}{dt} = 2b \times \frac{db}{dt} + 2y \frac{dy}{dt} \quad \text{As} \quad \frac{db}{dt} = 0 \quad \text{and} \quad \frac{dl}{dt} = u$$



$$\therefore 2l \times u = 0 + 2y \frac{dy}{dt}; \frac{dy}{dt} = \frac{l}{y} u = \frac{u}{y/l} = \frac{u}{\cos\theta}$$

55. (a): When a wire is stretched, work done on the wire is stored in it in the form of potential energy. As the wire snaps, this energy appears in the form of heat and temperature of wire increases.

56. (d): $r = 150 \text{ m}$, $\mu = 0.6$, $v = ?$

As force of friction provides the necessary centripetal force,

$$\text{therefore, } F = \mu R = \mu mg = \frac{mv^2}{r}$$

$$v = \sqrt{\mu rg} = \sqrt{0.6 \times 150 \times 9.8} = 29.7 \text{ m/s}$$

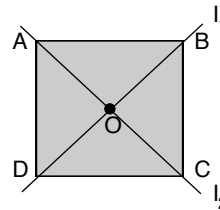
57. (b): We know, moment of inertia of a square about an axis through its centre and \perp to its plane,

$$I_0 = \frac{M}{12} (\ell^2 + \ell^2) = \frac{M \ell^2}{6}$$

According to theorem of \perp axes,

$$I_1 + I_2 = I_0 = \frac{M \ell^2}{6}$$

$$\text{As } I_1 = I_2 = I \Rightarrow 2I = \frac{M \ell^2}{6} \text{ or } I = \frac{M \ell^2}{12}$$



58. (b): Total energy of body orbiting close to earth's surface

$$E = \text{KE} + \text{PE} = \frac{1}{2} mv^2 + \left(-\frac{GMm}{R} \right) = \frac{1}{2} m \left(\frac{GM}{R} \right) - \frac{GMm}{R} = -\frac{GMm}{2R}$$

Let E_1 be the energy required to escape the body from the present location, then

$$E_1 + E = 0 \text{ or } E_1 - \frac{GMm}{2R} = 0 \text{ or } E_1 = \frac{GMm}{2R} = \text{KE.}$$

59. (d): Centripetal acceleration, $a_c = \frac{v^2}{R}$ acting horizontally. Acceleration due to gravity = g , acting vertically downwards.

Effective acceleration due to gravity.

$$g' = \sqrt{g^2 + \frac{v^4}{R^2}}; \text{ Time period, } T = 2\pi \sqrt{\frac{l}{g'}} = 2\pi \sqrt{\frac{l}{\left(g^2 + \frac{v^4}{R^2}\right)^{\frac{1}{2}}}}$$

60. (c): $Y = \frac{F}{(\pi D^2/4) \Delta l} \text{ or } \Delta l = \frac{4Fl}{\pi D^2 Y}$

or $\Delta l \propto \frac{1}{D^2}$ [$\because F, Y$ are constant]

$$\therefore \frac{\Delta l_1}{\Delta l_2} = \frac{l_1}{l_2} \times \frac{D_2^2}{D_1^2} = \frac{1}{2} \times \left(\frac{1}{2}\right)^2 = \frac{1}{8}$$

61. b) When the capacitor is disconnected, its charge remains constant i.e. $Q = \text{constant}$.

$$C = \frac{\epsilon_0 A}{d} \Rightarrow C \propto \frac{1}{d} \text{ as } d \text{ increases, } C \text{ decreases}$$

$$\text{Now, } Q = VC \Rightarrow V \propto \frac{1}{C} \text{ when } Q \text{ is constant}$$

\therefore as C decreases, V increases.

62. d) Potential gradient is independent of area of cross-section of wire.

63. a) $V \propto \sqrt{\text{specific charge}}$

$$\frac{v_1}{v_2} = \sqrt{\frac{q_1}{q_2} \times \frac{m_2}{m_1}} = \sqrt{\frac{1e}{2e} \times \frac{4p}{2p}} = 1$$

64. (d): Sound waves can be distinguished from light waves by polarization, where light waves can be polarized, sound waves cannot be polarized.

65. (b): Here, $T_1 = T_2$, $\rho_1 = \rho_2$, $r_1 = 2r_2$ or $D_1 = 2D_2$, $\frac{l_1}{l_2} = ?$

$$2f_1 = 3f_2 ; \frac{2}{l_1 D_1} \sqrt{\frac{T_1}{\pi \rho}} = \frac{3}{l_2 D_2} \sqrt{\frac{T_2}{\pi \rho}} ; \frac{l_1}{l_2} = \frac{2D_2}{3D_1} = \frac{2}{3} \times \frac{1}{2} = \frac{1}{3}$$

66. (c): $10 \log x = \text{adB}$; $\therefore \log x = \frac{\text{a}}{10} \text{ dB}$; $10 \log x = 30 \text{ db}$
 $\therefore \log x = 3 \text{ db}$; $\therefore x = 1000$; $10 \log y = 60 \text{ dB}$
 \therefore This sound 60 dB is 1000 times louder than 30 dB.
67. (d): Standardisation of thermometers is obtained using gas thermometer.
68. (c): Partial pressure of water vapour $P_w = 0.012 \times 10^5 \text{ Pa}$,
 Vapour pressure of water $P_v = 0.016 \times 10^5 \text{ Pa}$.
 The relative humidity at a given temperature is given by

$$= \frac{\text{Partial pressure of water vapour}}{\text{Vapour pressure of water}} = \frac{0.012 \times 10^5}{0.016 \times 10^5} = 0.75 = 75\%$$
69. (c): A real gas behaves as an ideal gas at high temperature and low pressure.
70. (c): Temperature of the gas remains unchanged because the random motion of molecules is responsible for temperature of gas but the ordered motion can not cause rise in temperature.
71. (d): In going from B to C and in going from D to A, $V = \text{constant}$. Therefore, $dV = 0$, $dW = P \cdot dV = 0$
 The incorrect statement is (d)
72. (a): Let θ be the temperature of the heater. In the steady state, heat released to the room = heat dissipated out of the room.
 As both the heats vary directly as the temperature difference.
 Therefore, $\theta - 20 = \alpha [20 - (-20)] = \alpha (40)$
 $\theta - 10 = \alpha [10 - (-40)] = \alpha (50)$
 Dividing, we get

$$\frac{\theta - 20}{\theta - 10} = \frac{\alpha 40}{\alpha 50} = \frac{4}{5} \Rightarrow 5\theta - 100 = 4\theta - 40 \Rightarrow \theta = 60^\circ\text{C}$$
73. (d): For mirror M_1 , $\angle i = 0^\circ \therefore \angle r = 0^\circ$, i.e., the reflected ray would retrace its path turning through 180° . Mirror M_2 has no effect.
74. (c): Let r be the radius of circle through which other objects become visible. The rays of light must be incident at critical angle C .

$$\sin C = \frac{1}{\mu} = \frac{r}{\sqrt{r^2 + h^2}} \text{ or } \mu^2 r^2 = r^2 + h^2 \text{ or } (\mu^2 - 1) r^2 = h^2$$

$$r = \frac{h}{\sqrt{\mu^2 - 1}} \Rightarrow \text{Diameter, } 2r = \frac{2h}{\sqrt{\mu^2 - 1}}$$
75. (c): Here, $i_1 = 45^\circ$, $A = 30^\circ$, $\mu = ?$
 As the ray retraces its path on reflection from AC, therefore,
 $i_2 = 0$; $r_2 = 0$
 As $r_1 + r_2 = A$; $r_1 + 0 = A = 30^\circ$, $r_1 = 30^\circ$

$$\mu = \frac{\sin i_1}{\sin r_1} = \frac{\sin 45^\circ}{\sin 30^\circ} = \frac{1/\sqrt{2}}{1/2} = \sqrt{2}$$
76. (b): A convex lens will become less convergent, when its focal length f increases. As

$$\frac{1}{f} = \left(\frac{\mu_2}{\mu_1} - 1 \right) \left(\frac{1}{R_1} + \frac{1}{R_2} \right)$$

 Where μ_1 is refractive index of the medium in which lens is placed. To increase f , μ_1 should increase. As μ_1 for water is greater than μ_1 for oil, therefore, convex lens will become less convergent in water.
77. (b): Here, $f_0 = 200 \text{ cm}$, $f_e = 5 \text{ cm}$
 Magnifying power, $M = \frac{f_0}{f_e} \left(1 + \frac{f_e}{d} \right)$

$$= \frac{200}{5} \left(1 + \frac{5}{25} \right) = 48$$
78. (c): At Brewster's angle, only the reflected light is plane polarised, but transmitted light is partially polarised.
79. (b) $v_d = \mu E$

$$\Rightarrow \mu = \frac{v_d}{E} = \frac{7.5 \times 10^{-4}}{3 \times 10^{-10}} = 2.5 \times 10^6 \text{ m}^2\text{V}^{-1}\text{s}^{-1}$$

80. (b) $R = \frac{V}{I} = \frac{1}{\text{slope}}$ Also, $R \propto T \propto \frac{1}{\text{slope}} \Rightarrow T_1 < T_2$

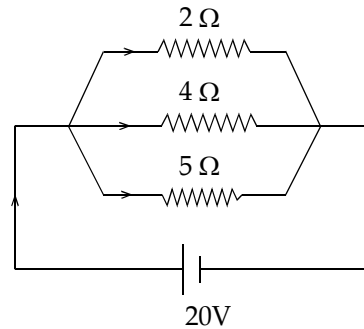
81. (c) Potential will be same across each resistance

$$I_1 = \frac{V}{R_1} = \frac{20}{2} = 10 \text{ A}$$

$$I_2 = \frac{V}{R_2} = \frac{20}{4} = 5 \text{ A}$$

$$I_3 = \frac{V}{R_3} = \frac{20}{5} = 4 \text{ A}$$

$$\therefore I_{\text{net}} = 10 + 5 + 4 = 19 \text{ A}$$



82. (a) Parallel currents attracts and antiparallel currents repel. Since both the wires A and C exert forces on wire B towards right, Hence, the wire B will move to the right.

83. (d) Its value is in order of 10^{-5} T

84. (c) Core of electromagnets are made of soft iron that is a ferromagnetic material with high permeability and low retentivity.

85. (c) As the induced current is anticlockwise, so induced magnetic field is outwards to the plane and thus, by Lenz's law, the direction of \vec{B} is outwards and decreasing with time.

86. (b) $I_{\text{rms}} = \frac{I_0}{\sqrt{2}} \Rightarrow I_0 = 25\sqrt{2} \text{ A}$

87. (b) $P_{\text{av}} = E_{\text{rms}} I_{\text{rms}} \cos \phi = \frac{E_0}{\sqrt{2}} \cdot \frac{I_0}{\sqrt{2}} \cdot \cos \phi = \frac{100}{\sqrt{2}} \cdot \frac{20}{\sqrt{2}} \cdot \cos \frac{\pi}{4} = \frac{1000}{\sqrt{2}}$

Wattless current, $I_W = I_{\text{rms}} \sin \phi = \frac{I_0}{\sqrt{2}} \cdot \sin \frac{\pi}{4} = \frac{20}{2} = 10$

88. (b) $K \cdot E_{\text{max}} = \frac{hc}{\lambda} - \frac{hc}{\lambda_0}$ i.e. $\frac{hc}{\lambda} \geq \frac{hc}{\lambda_0} \Rightarrow \lambda \leq \lambda_0$

89. (c) $\lambda_c = \frac{12.27 \text{ \AA}}{\sqrt{V}} = \frac{12.27}{\sqrt{10000}} \times 10^{-10} \text{ m} = 12.27 \times 10^{-12} \text{ m}$

90. (a) Radius of first orbit, $r \propto \frac{1}{Z}$

91. (a)

92. (a) $\frac{N}{N_0} = \left(\frac{1}{2}\right)^n$ Here $n = \frac{t}{T_{1/2}}$

For X, $\frac{1}{16} = \left(\frac{1}{2}\right)^{T_x} \Rightarrow \left(\frac{1}{2}\right)^4 = \left(\frac{1}{2}\right)^{T_x} \therefore T_x = \frac{8}{4} = 2$

For Y, $\frac{1}{256} = \left(\frac{1}{2}\right)^{T_y} \Rightarrow \left(\frac{1}{2}\right)^8 = \left(\frac{1}{2}\right)^{T_y}$ So, $\frac{T_x}{T_y} = \frac{2}{1} = 2 : 1$

93. (b) Binding energy $= \Delta mc^2 = \frac{0.3}{100} \times (3 \times 10^8)^2 = 2.7 \times 10^{14} \text{ J}$

94. (a) For intrinsic semi-conductor, $n_e = n_h = n_i$

For n-type semi-conductor, $n_e > n_h$

For p-type semi-conductor, $n_e < n_h$

Also $n_i^2 = n_e n_h \Rightarrow n_i = \sqrt{n_e n_h}$

95. (b) Voltage gain, $A_v = \beta \cdot \frac{R_0}{R_1} = \frac{61 \times 24}{3} = 488$

96. (a)

97. (b) Potential barrier developed in a junction diode opposes the flow of majority carriers only.

98. (a)

99. (b) Force exerted on coma by the sun's radiation pressure and solar wind cause an enormous tail form which points away from the sun.
100. (b) Neutron is 0.18% heavier than the proton.
101. (a)
102. (d) fins of fish and flipper of whale is analogous. remaining options are homologous.
103. (a) Ontogeny is the embryological races (life history) and phyllogeny is the ancestral races.
104. (d) origin of coral bed of different anthozoan, origin of fish belongs to Ordovician Age of fish and origin of amphibian belongs to Devonian.
105. (b) Minuta and Magna (tropic form) are found in *Entamoeba histolytica*. Minuta is non-pathogenic form while magma is a pathogenic form which has a quadrinucleated cyst.
106. (b) Contractile vacuole is for osmoregulation while food vacuole serves as stomach.
107. (d) Infection occurs in two stages: a first stage where the parasites are found in the blood and lymphatic system, followed by a second stage after the parasites invade the cerebro-spinal fluid of central nervous system.
108. (b) As with amoebas in general, the giant amoeba has an irregular cell with several pseudopods that can contract and expand. The cell has hundreds of nuclei, as it is common with species of the genus *Chaos*, this being the main difference between them and the closely related genus *Amoeba*.
109. (b) Blastula of sponges is coeloblastula. Parenchymula is the larva of *Leucosolenia*. Sterogatrula is gastrula of *Hydra*.
110. (d) The movement of *Hydra* with the help of legs is called as walking. Chemical irritants or prodding the *Hydra* will cause it to contract and then expand again in a slightly different, though random direction. If the noxious stimulus persists then it will move by looping, the body is extended and bent over to one side so that the mouth end touches the substrate, the tentacles adhere by discharging a specific type of nematocyst (glutinant) and then the base detaches and is drawn up toward the mouth and reattached. This looping may repeat and appears to be in a random direction. During looping the basal end may reattach behind the mouth, or off to the side beside the mouth, or it may loop around 180 degrees and be positioned in front of the mouth (somersaulting).
A *Hydra* can move up a glass wall in this way. Locomotion also occurs when the *Hydra* is not acquiring sufficient food.
111. (b) The segments of tapeworm or *Taenia solium* are called proglottids. Small groups of gravid proglottids regularly detach from the posterior end of the strobila and pass out with the host's faeces. Shedding of gravid proglottids is termed apolysis and the tapeworm exhibiting this phenomenon are called apolytic
112. (b) Oenocytes are insect cells which involve in the lipid processing and detoxification of fat present in close association with the insect epidermis. They contain lipids that participating in the wax synthesis and hence secrete wax at the outer surface of the body wall.
113. (c) *Plasmodium falciparum* is most dangerous *Plasmodium* which causes malignant malaria, urin becomes black and blood clotting in the brain.
114. (c) Phaosome is the L shaped lens which is found in the anterior-dorsal part of earthworm.
115. (b) In earthworm 2 pairs of anterior loops which is located at 10th and 11th segment of earthworm.
116. (a) Acrosomal reaction takes place in presence of Ca^{++} and Mg^{++} ions, Hyaluronic acid and hyaluronidase enzyme in amphibian.
117. (a) Gray Crescent area is found in fertilized egg, in opposite to cone of reception. It determines body symmetry and area of blastopore.
118. (a) It is formed during fertilization and attach with the wall of stomach of FAM.
119. (b) Corpus callosum is only found in human being.
120. (b) Bidder's canal is found in kidney and associated with the function of testis. It collects sperms.
121. (a) All kinds of food digestion occurs in abomassum of ruminant stomach.
122. (b) Hiccup is the sudden onset of erratic diaphragmatic and intercostal muscle contraction and immediately followed by laryngeal closure. The abrupt air rush into lungs elicits a "hic" sound. (closer of glottis)
123. (d) kidneys produce a hormone called erythropoietin or EPO, which stimulates the bone marrow to make red blood cells needed to carry oxygen (O_2) throughout the body.
124. (a) For most substances actively re-absorbed or secreted in the kidney, there is a transport maximum. Transport maximum for glucose is expressed by the maximum transporting capacity of the SGLT transportation system. Excessive glucose is not reabsorbed and consequently passes into urine.
125. (a)
126. (a) The hepatic portal vein supplies 75% of the blood to the liver, while the hepatic arteries supply the remaining 25%. Approximately half of the liver's oxygen demand is met by the hepatic portal vein, and half is met by the hepatic arteries.
127. (b)

Cerebral lobe	Major Functions
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Frontal lobe	<ul style="list-style-type: none"> • Personality, behavior, emotion. • Judgement, planning, problem solving. • Speech - Broca's area (location- left frontal lobe)(area number 44 and 45) • Body movement • Intelligent, concentration, self awareness.
Parietal lobe	<ul style="list-style-type: none"> • Interprets language, words. • Sense of touch, pain, temperature. • Interprets signals from vision, hearing. • Spatial and visual perception.
Temporal lobe	<ul style="list-style-type: none"> • Understanding language - Wernicke' area (location- left temporal lobe)(area number 22) • Memory • Hearing • Sequencing and organization.
Occipital lobe	<ul style="list-style-type: none"> • Interprets vision (color, light movement).

128. (b) Rabies virus is transmitted through direct contact (such as through broken skin or mucous membranes in the ear, eyes, nose, or mouth) with saliva or brain/nervous system tissue from an infected animal. People usually get rabies from the bite of a rabid animal.
129. (d) The medial end of the anterior (superior) semicircular canal joins with the upper part of the posterior canal to form the common bony limb (crus commune), which opens into the upper and medial part of the vestibule.
130. (d) Iris controls the amount of the light entering the eyes through the pupil by opening or closing. The iris is the ring of pigmented tissue surrounding the pupil that varies in color.
131. (a) FSH, or follicle-stimulating hormone, is a hormone secreted by the adrenal pituitary gland that primarily controls the purpose of sertoli cells.
132. (d) Erection of the penis in humans is an example of a hydrostatic skeleton as this place due to forceful contraction in corpora spongiosum muscles in it.
133. (d) Beard and moustaches develop in women due to hormonal imbalance when androgens are secreted in more amounts. Androgens are secreted from adrenal cortex both in males and females but in a very less amount in females. Principle androgen in males is testosterone which is responsible for development of secondary sexual characters like beard and moustache. When the levels of androgens are high in females, they develop facial hair, beard and moustache.
134. (c) Metastasis is spread of cancerous cells from an initial or primary site to a different or secondary site within the host's body. Cancer occurs after cells are genetically altered to proliferate rapidly and indefinitely. Metastasis involves only malignant tumour because in case of a benign tumour, the cells are non-cancerous and they do not undergo rapid proliferation.
135. (a)
136. (a) A sarcomere is the region from one Z line to the next Z line. Many sarcomeres are present in a myofibril, resulting in the striation pattern characteristic of skeletal muscle. Each I band has a dense line running vertically through the middle called a Z disc or Z line. Hence, Sarcomere is the distance between Z-line to Z-line.
137. (d) Aerobic respiration gives more energy but is a slow process. Anaerobic respiration like lactic acid fermentation is a fast process but releases less energy. In the case of rapid muscular contraction, the muscles perform lactic acid fermentation to provide for rapid energy intake. This process releases lactic acid which causes pain and muscle fatigue
138. (a)
139. (d)
140. (b) The body's first line of antiviral defense is cytokines that are secreted by host cells in response to virus infection. By inducing the expression of hundreds of IFN-stimulated genes, several of which have antiviral functions, IFNs block virus replication at many levels.
- 141 a) **Tryptophan** is used for synthesis of vitamin nicotinamide, chemical messengers like serotonin and melatonin, and plant growth hormones like indole acetic acid (IAA) and indole butyric acid (IBA). **Tyrosine** is the precursor for thyroid hormone (thyroxine), adrenaline, noradrenaline, dopamine and skin pigment melanin
- 142 d) Prostaglandins are derivatives of arachidonic acid and other 20 carbon fatty acids, which have several functions like vasodilation, vasoconstriction, bronchoconstriction, acid production in stomach.
- 143 c) Many algae such as Volvox, Spirogyra and some species of Chlamydomonas have a haplontic life cycle.
- 144 c) Syconus fruit develops from the hypanthium inflorescence such as Ficus carica, religiosa, and Benghalensis.
- 145 a) Bacteriophage $\phi\times 174$ is a single-stranded DNA virus that infects Escherichia coli. It belongs to the family microviridae.

- 146 d) Kuru is caused by the accumulation of infectious, misfolded proteins called prions in the nervous system. The disease is spread through cannibalism of infected tissue (i.e. when an individual eats the human tissue of an infected individual).
- 147 b) Industrial vitamin B12 production by *Pseudomonas denitrificans*.
148. b) Phloem in gymnosperms doesn't have sieve tubes and Companion cells. they have sieve cells and albuminous cells for the conduction of food material.
- 149 a) Paramylon (paramylum) is a carbohydrate similar to starch. The chloroplasts found in *Euglena* contain chlorophyll which aids in the synthesis of carbohydrates to be stored as starch granules and paramylon.
- 150 c) If air is polluted with sulphur dioxide, then lichens will die in that particular environment. Due to this property, lichens are considered to be the indicators of the air pollution.
- 151 c) Peristome teeth: Total 32 in two rows 16+16, outer 16 are thick bigger in size while inner 16 are smaller and thin. Teeth help in dispersal of spore filled in sporangium of capsule of *Funaria*.
- 152 b) Clay soil has the finest particles of all the soils. Hence, it is the least porous soil. Sand soil has the largest size of particles. They are the most porous soil.
- 153 d) Eolian is the soil transported by the blowing wind.
Alluvial is the soil transported by water.
Colluvial is the soil transported by gravity.
Glacial is the soil transported by glaciers.
- 154 d) Proteins and nucleic acids of the dead remains of plants, animals and excretory products of animals are degraded by microorganisms, with the liberation of ammonia. This process is called ammonification.
- 155 d) Biomass is the total dry weight of living biological organisms in a given area or ecosystem at a given time. Forest ecosystem has formed the most massive and complex ecosystems of the earth.
- 156 b) Primary producers of the deep sea hydrothermal vent ecosystem are chemosynthetic bacteria.
- 157 b) During the S phase, the DNA molecules undergo replication to create a copy of their DNA. However, the number of chromosomes remains same.
- 158 b) During Pachytene of Meiosis-I, the paired chromosomes of each bivalent condense and become more distinct.
- 159 b) Cell plate grows outwards from the centre (centrifugal) and fuses with the plasma membrane of the cell dividing the cell into two.
- 160 d) Klinefelter syndrome also known as 47,XXY or XXY, is the set of symptoms that result from two or more X chromosomes in males.
- 161 a) Smooth ER synthesizes lipids. It metabolizes carbohydrates. It synthesizes steroids like hormones and vitamins. It performs the function of detoxification.
- 162 a) Microtubules help in the formation of cilia and flagella which help in the movement and locomotion of the cell. Special arrangement of microtubules that include centrioles and basal bodies will give rise to the formation of cell organelles.
- 163 a) Colchicine's ability to induce polyploidy can be also exploited to render infertile hybrids fertile.
- 164 b) Holandric gene occurs on the Y-chromosome only. It is inherited only by the male and is a recessive gene that always expresses.
- 165 d) The phenomenon of co-dominance is a deviation from the Mendelian Law of Dominance whereby two alleles of a gene present in a heterozygous individual are coding for a functional protein, and so, both of them result in the phenotype.
166. c)
- 167 b) Pod length was not used in his experiments
168. c) Translocation is the process causes a gene to move from one linkage group to another. It is the separation of a chromosome segment and its joining to a non-homologous chromosome
- 169 c)
- 170 c) Companion cells are one of the parenchyma cells of phloem tissues. The role of these sieve tubes is dependent on companion cells.
171. c) The water potential of pure water at standard temperature, which is not under any pressure, is taken to be zero. If some solute is dissolved in pure water, the solution has less free water molecules and the concentration of water decrease, reducing water potential.
172. d) Capillary, hygroscopic and bound water is present in the soil so it can be included in field capacity. Bound water, is an extremely thin layer of water surrounding mineral surfaces.
173. d) PEP, the primary CO₂ acceptor, is present in the mesophyll cell. PEP by CO₂ in the presence of the enzyme PEPCase is converted to oxaloacetic acid which is further converted to malic acid.
- 174 b) Priestly hypothesized that foul air produced during burning of candles or animal (mice) respiration could be converted into pure air by plants (mint). Priestley discovered oxygen.
175. b) Acetyl CoA can now enter Krebs' cycle by combining with oxaloacetic acid which is a 4 carbon compound. So the citric acid that is formed is a 6 carbon compound
176. b) Gibberellin helps in elongation of the internodes in such a way that dwarf plants overcome the genetic dwarfism.
177. d) Phytochrome is a blue-green pigment present in plants which is used to detect light. It act as a Azolla is a fern, which harbours blue green algae on its leaves. The blue green algae are good nitrogen fixers, which makes Azolla a biofertilizersynthesis, flowering.

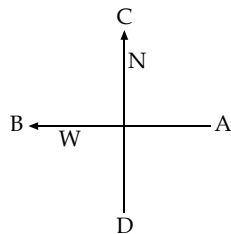
178. a) Protoplasm comprises of cytoplasm, nucleus and other cell organelles. Growth at cellular level includes increase in size of nucleus and other cell organelles.
179. a) Azolla is a fern, which harbours blue green algae on its leaves. The blue green algae are good nitrogen fixers, which makes Azolla a biofertilizer
180. b) Narrow spectrum antibiotics are active against a selected group of bacterial types. Narrow spectrum antibiotics are used for the specific infection when the causative organism is known.
181. (b) $ABC = 1 \times 2 \times 3 = 6$
 $EFG = 5 \times 6 \times 7 = 210$
 $IJK = 9 \times 10 \times 11 = 990$
182. (c) Second is obtained from first.

183. (b)
- | | | | | | |
|-------|-------|-------|-------|-------|--------|
| red | color | chalk | green | color | flower |
| 6 | 5 | 2 | 8 | 5 | 9 |
| white | color | chalk | | | |
| 4 | 5 | 2 | | | |

∴ 4 means white

184. (b) Total no. of boys = $20 + 8 + 4 = 32$

185. (b)



186. (d) CP of 12 balls = SP of 17 balls = Rs. 720
 CP of 1 balls = Rs. $\left(\frac{720}{12}\right) = \text{Rs. } 60$
187. (c) Sum of 80 numbers = $80 \times 42 = 3360$
 Sum of 85 numbers = $85 \times 45 = 3825$
 Average of last 5 numbers = $\frac{3825 - 3360}{5} = \frac{465}{5} = 93$
188. (a) Let two numbers be $5x$ and $3x$
 $5x - 3x = 10$
 or, $2x = 10$
 $\therefore x = 5$
 Now, $5x \times 3x = 15x^2 = 15 \times 5^2 = 15 \times 25 = 375$
189. (b) Trick: $30 + (-20) + \frac{30 \times (-20)}{100}$
 $= 30 - 20 - \frac{600}{100} = 30 - 20 - 6 = 4$
190. (c) (A + B) can do work in 18 days
 i.e. $\left(A + \frac{A}{2} = \frac{3A}{2}\right)$ can do work in 18 days
 i.e. A can do work in $\left(18 \times \frac{3}{2} = 27\right)$ days
191. (c)
192. (b) Trick: $\frac{14}{2} = 7$
193. (a)
194. (d)
195. (b) As the number 2, 3, 4 and 5 are adjacent to 6.
 Hence, the number on the face opposite to 6 is 1.
196. (d)
197. (b) Minimum case = $30 - 1 = 29$
198. (b) $11 \times 2 + 6 \div 2 = 25$
 $6 \times 2 + 8 \div 2 = 16$

199. (d) $5 \times 2 + 12 \div 2 = 16$
 $2 + 3 = 5$
 $5 + 5 = 10$
 $10 + 7 = 17$
 $17 + 9 = 26$
 $26 + 11 = 37$
 $37 + 13 = 50$
 $50 + 15 = 65$

200. (b)

