Subject	Topic	Mock Test - 01	Date
C + P + B	Complete Syllabus	NEET – CT N-20250403	13th May 2026

Max. Marks: 720 **Duration: 3 Hours**

1. **This paper consists of 180 questions with 3 parts of Chemistry, Physics and Biology**

   - **Chemistry: *(Q. No. 1 to 45) Multiple Choice Questions with one correct answer. A correct answer carries 4 Marks. A wrong answer carries a penalty of 1 mark.***
   - **Physics: *(Q. No. 46 to 90) Multiple Choice Questions with one correct answer. A correct answer carries 4 Marks. A wrong answer carries a penalty of 1 mark.***
   - **Biology: *(Q. No. 91 to 180) Multiple Choice Questions with one correct answer. A correct answer carries 4 Marks. A wrong answer carries a penalty of 1 mark.***

2. **The OMR sheet NEET-2026-180Q is to be used**

3. **Use of calculators and log tables is prohibited**

4. **Darken the appropriate bubble using a pen in the OMR sheet provided to you. Once entered, the answer cannot be changed. Any corrections or modifications will automatically draw a penalty of 1 mark**

5. **No clarification will be entertained during the examination. Doubts in the paper can be reported to the coordinator after the exam**

6. **If the details in the OMR Sheet are not filled, If the OMR sheet is mutilated, torn, white Ink used, the circles filled and scratched, then the OMR sheet will not be graded**

   All the best!!

Useful Data

At. Wt.:

$N = 14;\ O = 16;\ H = 1;\ S = 32;\ Cl = 35.5;\ Mn = 55;\ Na = 23;\ C = 12;\ Ag = 108;\ K = 39;\ Fe = 56;\ Pb = 207$

Physical Constants:

$h = 6.626 \times 10^{-34}\ \text{Js}$, $N_a = 6.022 \times 10^{23}\ \text{mol}^{-1}$, $c = 2.998 \times 10^{8}\ \text{m s}^{-1}$, $m_e = 9.1 \times 10^{-31}\ \text{kg}$, $R = 8.314\ \text{J mol}^{-1}\ \text{K}^{-1}$

Chemistry

Multiple Choice Questions with one correct answer. A correct answer carries 4 marks. A wrong answer carries a penalty of 1 mark. **45 x 4 = 180**

1. The polarity of the covalent bond among the following is maximum in

   (a) $F - F$ (b) $O - F$ (c) $N - F$ (d) $C - F$

   Sol: Electronegativity difference of C and F is highest, so polarity is maximum

   Ans: (d)

2. The Lassaigne's extract is boiled with conc HNO_3 while testing for the halogens. By doing so it

   (a) decomposes Na_2S and $NaCN$, if formed

   (b) helps in the precipitation of $AgCl$

   (c) increases the solubility product of $AgCl$

   (d) increases the concentration of NO_3^- ions

   Sol: $L.E + HNO_3 \xrightarrow{\text{boil}} NaCN + Na_2S$

   Otherwise these ions would interfere with $AgNO_3$ test for halogen

   Ans: (a)

3. The wavelength of photon obtained by electron transition between two levels in H - atom and singly ionised He are λ_1 and λ_2 respectively, then

   (a) $\lambda_2 = \lambda_1$ (b) $\lambda_2 = 2\lambda_1$ (c) $\lambda_2 = \frac{\lambda_1}{2}$ (d) $\lambda_2 = \frac{\lambda_1}{4}$

   Sol: $E_H = 13.6\ \text{eV}$

   $E_{He^+} = 13.6 \times 2^2$

   $E \propto \frac{1}{\lambda}$

$\therefore \lambda_{He^+} = \lambda_{\frac{H}{4}}$

Ans: (d)

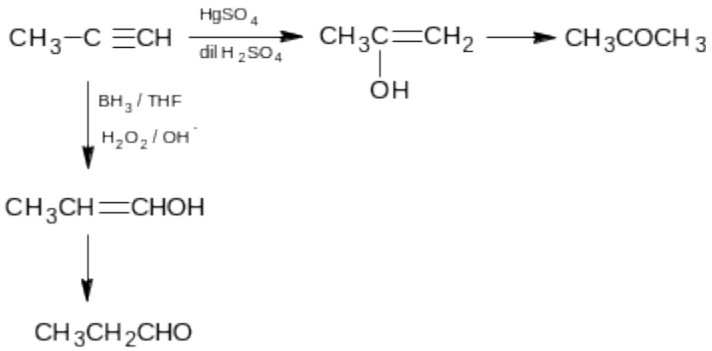
4. $B \leftarrow \underset{H_2O_2/^-OH}{\overset{BH_3/THF}{-}} - CH_3 - C \equiv CH - \overset{HgSO_4/dilH_2SO_4}{\longrightarrow} A$,

A and B are

(a) CH_3CH_2CHO, CH_3COCH_3 (b) CH_3COCH_3, CH_3CH_2CHO

(c) CH_3COCH_3 both (d) $CH_3COCH_3, CH_3CH_2CH_2OH$

Sol:



Ans: (b)

5. The set representing the correct order of ionic radius is

(a) $Na^+ > Li^+ > Mg^{2+} > Be^{2+}$ (b) $Li^+ > Na^+ > Mg^{2+} > Be^{2+}$

(c) $Mg^{2+} > Be^{2+} > Li^+ > Na^+$ (d) $Li^+ > Be^{2+} > Na^+ > Mg^{2+}$

Sol: As on moving left to right across the period radius or ionic radius decreases and on moving down the group it increases so following this periodic trends of size the correct order is $Na^+ > Li^+ > Mg^{2+} > Be^{2+}$

Ans: (a)

6. Oxidation of ^{1}- butene with hot $KMnO_4$ solution produces:

(a) $CH_3CH_2COOH + HCOOH$ (b) $CH_3CH_2COOH + CO_2$

(c) $CH_3COOH + CO_2$ (d) $(CH_3)_2 C = O + CO_2$

Sol: $CH_3CH_2COOH + CO_2$

Ans: (b)

7. The volume of methane evolved by treatment of $16.6\ g$ of methyl magnesium iodide with water at S.T.P. is [At.mass I =127]

(a) $224\ mL$ (b) $2.24\ L$ (c) $0.224\ L$ (d) $22.4\ L$

Sol: $\underset{0.1}{CH_3MgI} + H_2O \rightarrow CH_4$

$\frac{16.6}{166} = 0.1$ mole

0.1 mole CH_4 is produced

Whose volume is $0.1 \times 22.4 = 2.24\ l$

Ans: (b)

8. The heat of combustion of ethanol determined in a bomb calorimeter is $-670.48\ k\ cals\ mole^{-1}$ at $25^{o}C$. What is ΔH at $25^{o}C$ for the reaction?

(a) -335.24 kcals (b) -671.08 kcals (c) -670.48 kcals (d) $+670.48$ kcals

Sol: $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$

$\Delta n = -1$

$\Delta H = \Delta U + \Delta nRT$

$= -670.48 - 1 \times 2 \times 298 \times 10^{-3}$

$= -671.08$ k cal

Ans: (b)

9. Fixed volume of $0.1\ M$ benzoic acid solution is added into $0.2\ M$ sodium benzoate solution and formed a $300\ ml$, resultant acidic buffer solution. If pH of this buffer solution is 4.5 then find added volume of benzoic acid (Given: pK_a benzoic acid $=4.2$)

(a) $100\ ml$ (b) $150\ ml$ (c) $200\ ml$ (d)260 ml

Sol: $pH = pK_a + \log\frac{\text{salt}}{\text{acid}}$

$4.5 = 4.2 + \log\frac{0.2(300 - V)}{0.1V}$

$2V = 600 - 2V$

$4V = 600 \Rightarrow V = 150$ ml

Ans: (b)

10. Which one of the statement of quantum numbers is false?

(a) Quantum number were proposed out of necessity in Bohr model of the atom

(b) Knowing n and l it is possible to designated a subshell

(c) The principal quantum number alone can give the complete energy of an electron in any atom (d) Azimuthal quantum number refers to the subshell to which an electron belongs and describes the motion of the electron

Sol: Energy of electron is given by $(n+l)$ rule

Ans: (c)

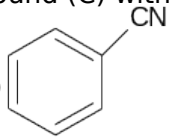
11. Out of the following which complex will show geometrical isomerism?

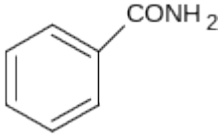
(a) $\left[Pt(NH_3)_2Cl_2\right]$ (b) $Ni(CO)_4$ (c) $Na_3\left[Ni(CN)_4\right]$ (d) $K\left[Ag(CN)_2\right]$

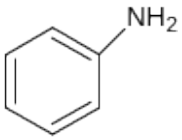
Sol: Compound with formula Ma_2b_2 (where a, b are mono dented) can have cis, $trans$ isomer

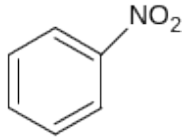
Ans: (a)

12. A given nitrogen-containing aromatic compound (A) reacts with Sn/HCl, followed by HNO_2 to give an unstable sompound (B). (B), on treatment with phenol, forms a beautiful colour compound (C) with the molecular formula $C_{12}H_{10}N_2O$. The structure of compound (A) is:

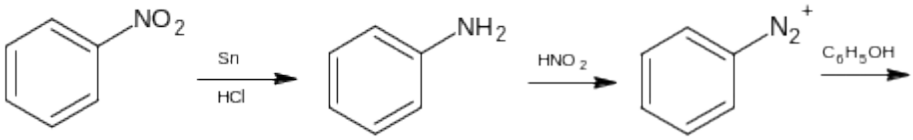
(a) 

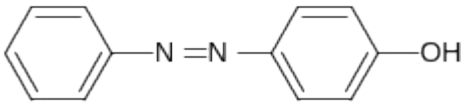
(b) 

(c) 

(d) 

Sol:





$C_{12}H_{10}N_2O$

Ans: (d)

13. Experimentally it was found that a metal oxide has formula $M_{0.98}O$. Metal M, is present as M^{2+} and M^{3+} in its oxide. Fraction of the metal which exists as M^{3+} would be:

(a) 7.01% (b) 4.08% (c) 6.05% (d) 5.08%

Sol: $2x+3(98-x)=200$

$2x-3x+294=200$

$x=94$

$98-x=4$

% of $M^{3+}=\frac{4\times100}{98}=4.08\%$

Ans: (b)

14. Fe^{3+} compounds are more stable than Fe^{2+} compounds because [atomic number of $Fe=56$]

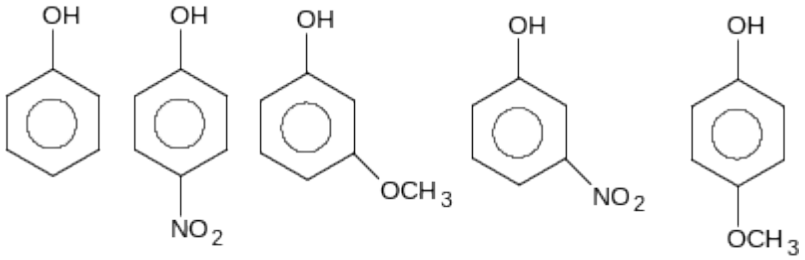
(a) Fe^{3+} has smaller size than Fe^{2+} (b) Fe^{3+} has $3d^5$ configuration (half-filled)

(c) Fe^{3+} has higher oxidation state (d) Fe^{3+} is paramagnetic in nature

Sol: $3d^5$ configuration is more stable due to singly occupied half-filled orbitals

Ans: (b)

15. Mark the correct order of decreasing acid strength of the following compounds



(i) (ii) (iii) (iv) (v)

(a) (v) > (iv) > (ii) > (i) > (iii)

(b) (ii) > (iv) > (i) > (iii) > (v)

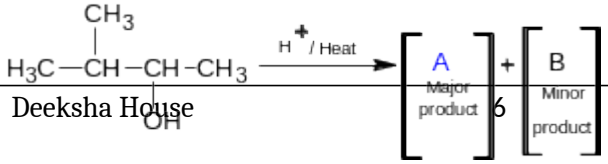
(c) (v) > (iv) > (iii) > (ii) > (i)

(d) (ii) > (iv) > (iii) > (i) > (v)

Sol: (ii) > (iv) > (iii) > (i) > (v)

Ans: (d)

16. In the following reactions,

(i) 

(ii) A $\xrightarrow[\text{in absence of peroxide}]{\text{HBr, dark}}$ [C Major product] + [D Minor product]

the major products (A) and (C) are respectively:

(a) $H_2C{=}C(CH_3)-CH_2-CH_3$ and $CH_2(Br)-CH(CH_3)-CH_2-CH_3$

(b) $CH_3-C(CH_3){=}CH-CH_3$ and $CH_3-C(CH_3)(Br)-CH_2-CH_3$

(c) $CH_3-C(CH_3){=}CH-CH_3$ and $CH_3-CH(CH_3)-CH(Br)-CH_3$

(d) $CH_2{=}C(CH_3)-CH_2-CH_3$ and $CH_3-C(CH_3)(Br)-CH_2-CH_3$

Sol:

$CH_3-CH(CH_3)-CH(OH)-CH_3 \xrightarrow[-H_2O]{H^+/\Delta} CH_3-C^{\oplus}(CH_3)-CH_2-CH_3$ (1, 2 - H^- Shift)

$CH_3-C(CH_3){=}CH-CH_3$ (A) $\xrightarrow{HBr}$ $CH_3-C(CH_3)(Br)-CH_2CH_3$ (C)

Ans: (b)

17. Two litre of N_2 at $0\,^oC$ and $5\ atm$ are expanded isothermally against a constant external pressure of $1\ atm$ until the pressure of gas reaches $1\ atm$. Assuming the gas to be ideal calculate work of expansion?

(a) -504 joule (b) -405 joule (c) $+810$ joule (d) -810 joule

Sol: $P_1V_1 = P_2V_2$

$V_2 = \frac{5\times 2}{1} = 10$

$W = -P_{ext}(V_2 - V_1)$

$=-1(10-2)=-8\ \text{latm}=\frac{-8\times8.314}{0.0821}=-810.13\ \text{joules}$

Ans: (d)

18. The rate of first order reaction is $1.5\times10^{-2}\ \text{mol L}^{-1}\text{min}^{-1}$ at $0.5\ \text{M}$ concentration of the reactant. The half life of the reaction is

(a) $7.53\ \text{min}$ (b) $0.383\ \text{min}$ (c) $23.1\ \text{min}$ (d) $8.73\ \text{min}$

Sol: $1.5\times10^{-2}=k\times0.5$

$k=3\times10^{-2}$

$t_{\frac{1}{2}}=\frac{0.693}{3\times10^{-2}}=23.1\ \text{min}$

Ans: (c)

19. Among $(i)\ C_6H_5NH_2\ (ii)\ CH_3NHCH_3\ \ (iii)\ (CH_3)_2NCH_3$ and $(iv)\ NH_3$, the correct order of basic strength follows the order

(a) $(ii)>(iii)>(iv)>(i)$ (b) $(ii)>(iii)>(i)>(iv)$ (c) $(iii)>(ii)>(iv)>(i)$ (d) $(iii)>(ii)>(i)>(iv)$

Sol: Dimethyl amine > trimethyl amine > ammonia > aniline

Ans: (a)

20. Many of the lanthanide ions are coloured in solid state as well as in solutions. The colour is due to:

(a) Electronic excitation from $4f$ to $5f$ subshell

(b) Electronic excitation from $4f$ to $5d$ subshell

(c) Electronic excitation from $5d$ to $4f$ subshell

(d) Electronic excitation within $4f$ subshell

Sol: Colouration is due to $f-f$ transition

Ans: (d)

21. Which of the following alcohols gives a red colour in Victor Meyer test

(a) $n-$ Propyl alcohol (b) Isopropyl alcohol (c) $(CH_3)_3C-OH$ (d) sec. Butyl alcohol

Sol: Primary alcohol gives red colour

Ans: (a)

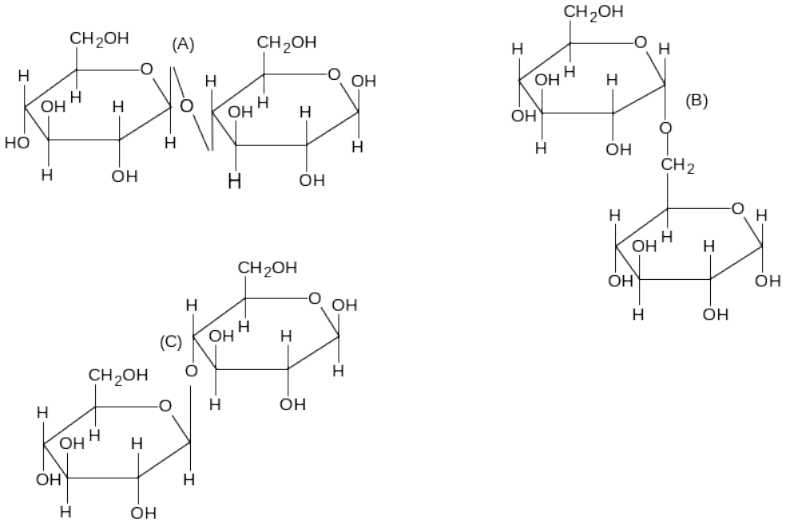
22. A carbonyl compound gives pink colour with Schiff's reagent and a yellow precipitate when boiled with iodine and caustic alkali. It also gives a red precipitate with Fehling's solution. It is likely to be

(a) Formaldehyde (b) Propionaldehyde (c) Acetaldehyde (d) Crotonaldehyde

Sol: $CH_3CHO \rightarrow$ +ve iodoform test and also give colour with Schiff's base

Ans: (c)

23. Three structures are given below in which two glucose units are linked. Which of these linkages between glucose units are between C_1 and C_4 and which linkages are between C_1 and C_6



(a) (A) is between C_1 and C_4; (B) and (C) are between C_1 and C_6

(b) (A) and (B) are between C_1 and C_4; (C) is between C_1 and C_6

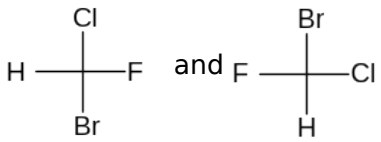
(c) (A) and (C) are between C_1 and C_4; (B) is between C_1 and C_6

(d) (A) and (C) are between C_1 and C_6; (B) is between C_1 and C_4

Sol: (A) and (C) are between C_1 and C_4; (B) is between C_1 and C_6

Ans: (c)

24. The following two compounds are



(a) Enantiomers (b) Diastereomers (c) Identical (d) Epimers

Sol:

So they are enantiomers

Ans: (a)

25. Density of a $2.05\ M$ solution of acetic acid in water is $1.02\ g\,mL^{-1}$. The molality of the solution is

(a) $1.14\ mol\,kg^{-1}$ (b) $3.28\ mol\,kg^{-1}$ (c) $2.28\ mol\,kg^{-1}$ (d) $0.44\ mol\,kg^{-1}$

Sol: $2.05\ mole$ in $1000\ cc$ solution

Wt. of solution $=10^3 \times 1.02 = 1020\ g$

$$m = \frac{2.05 \times 1000}{1020 - (2.05 \times 60)} = 2.28$$

Ans: (c)

26. H_3PO_4 is a tribasic acid and one of its salt is NaH_2PO_4 what volume of $1\ M$ $NaOH$ solution should be added to $12\ g$ NaH_2PO_4 to convert it into Na_3PO_4? (at. wt of $P = 31$)

(a) $100\ mL$ (b) $200\ mL$ (c) $80\ mL$ (d) $300\ mL$

Sol: $$\frac{\frac{12}{23+2+31+64}}{2} = V \times 1$$

$V = 0.2\ l = 200\ ml$

Ans: (b)

27. $10800\ C$ of electricity through the electrolyte deposited $2.977\ g$ of metal with atomic mass $106.4\ g\,mol^{-1}$. The charge on the metal cation is

(a) $+4$ (b) $+3$ (c) $+2$ (d) $+1$

Sol: 1 eq. deposited by $96500\ C$

$\frac{\frac{2.977}{106.4}}{x}$ eq. deposited by $\frac{96500 \times 2.977x}{106.4} = 10800$

$x = 4$

Ans: (a)

28. $HCOOH$ on treating with conc. H_2SO_4 forms

(a) CO_2 (b) CO (c) Oxalic acid (d) CH_3COOH

Sol: $HCOOH \xrightarrow[-H_2O]{\text{conc}H_2SO_4} CO$

Ans: (b)

29. What will be the change in internal energy when $12kJ$ of work is done on the system and $2kJ$ of heat is given by the system?

(a) $+10kJ$ (b) $-10kJ$ (c) $+5kJ$ (d) $-5kJ$

Sol: Heat evolved $=2\,\text{kJ}$

Work done on the system $=+12\,\text{kJ}$

$\Delta U = q + W = -2 + 12 = +10\,\text{kJ}$

Ans: (a)

30. The specific conductance of a salt of $0.01\,\text{M}$ concentration is $1.061\times10^{-4}\,\text{Scm}^{-1}$. Molar conductance of the same solution will be----- $\text{Scm}^2\text{mol}^{-1}$

(a) 1.061×10^{-4} (b) 1.061 (c) 10.61 (d) 106.1

Sol: $\lambda = \dfrac{1.06\times10^{-4}\times10^{3}}{0.01} = 10.61$

Ans: (c)

31. The degree of hydrolysis of which of the following salt is independent of the concentration of salt solution?

(a) CH_3COONa (b) CH_3COONH_4 (c) NH_4Cl (d) $NaCl$

Sol: $NaCl$ is a strong electrolyte

Ans: (d)

32. The correct order of increasing bond angles in the following triatomic species is

(a) $NO_2^+ < NO_2 < NO_2^-$ (b) $NO_2^+ < NO_2^- < NO_2$

(c) $NO_2 < NO_2^- < NO_2^+$ (d) $NO_2^- < NO_2 < NO_2^+$

Sol: $NO_2^{\oplus} \rightarrow sp$ hybridization

$NO_2 \rightarrow sp^2$ hybridization (when N_2O_4 is formed)

$NO_2^- \rightarrow sp^2$ with one lone pair (bent)

$\therefore$ Bond angle $NO_2^+ > NO_2 > NO_2^-$

Ans: (d)

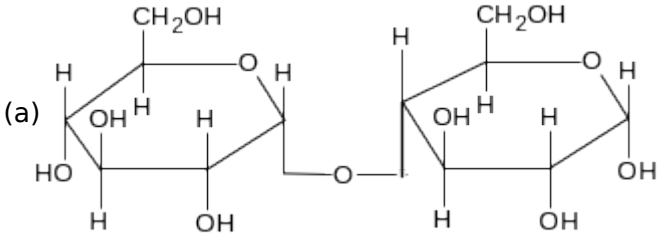
33. Give the IUPAC name of the complex compound $\left[Co(NH_3)_4(H_2O)Br\right](NO_3)_2$

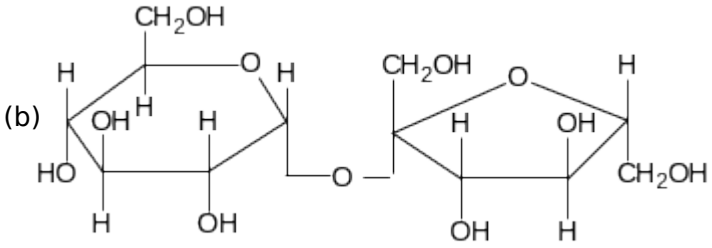
(a) Bromoaquotetraamine Cobalt (III) nitrate (b) Bromoaquotetraaminocobalt (III) nitrate (c) Bromoaquatetraammine cobalet (III) nitrate (d) Tetraammineaquabromido cobalt (III) nitrate

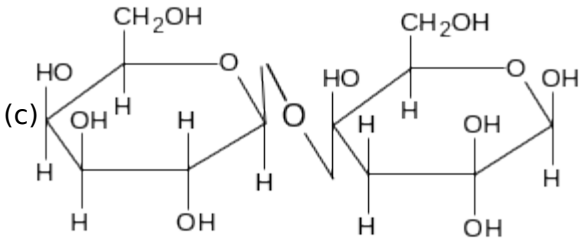
Sol: Tetraammineaquabromido cobalt (III) nitrate

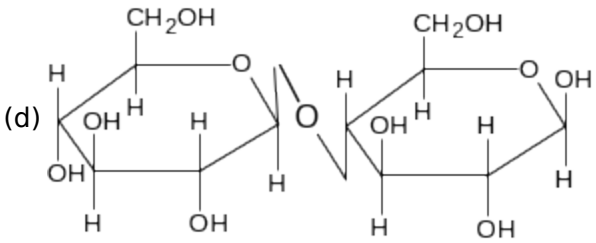
Ans: (d)

34. Which of the following disaccharide is a non-reducing suger

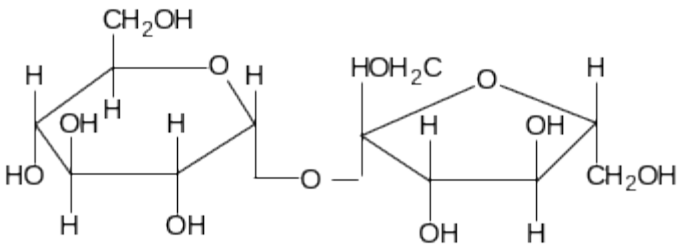
(a) 

(b) 

(c) 

(d) 

Sol:

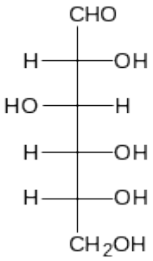


Ans: (b)

35. The number of chiral centres in the open-chain structure of glucose is

(a) 3 (b) 4 (c) 5 (d) 6

Sol:



Ans: (b)

36. In aqueous solution Eu^{2+} act as

(a) an oxidising agent (b) reducing agent

(c) can act as redox agent (d) None of these

Sol: $\underset{\text{reducing agent}}{Eu^{2+}} \rightarrow Eu^{3+}$

Ans: (b)

37. The vapour pressure of pure benzene and toluene are 160 and $60\ \text{torr}$ respectively. The mole fraction of toluene in vapour phase in contact with equimolar solution of benzene and toluene is

(a) 0.50 (b) 0.6 (c) 0.27 (d) 0.73

Sol:

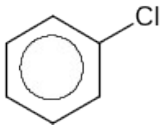
$P = 160 \times 0.5 + 60 \times 0.5$

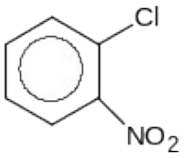
$= 110$

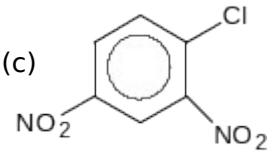
$X_{\text{soluene}} = \frac{60 \times 0.5}{110} = \frac{30}{110} = 0.27$

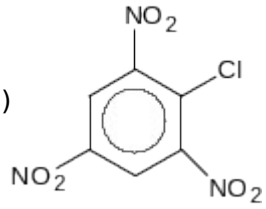
Ans: (c)

38. Which of the following undergoes hydrolysis most easily

(a) 

(b) 

(c) 

(d) 

Sol: $S_N Ar$ reaction

Ans: (d)

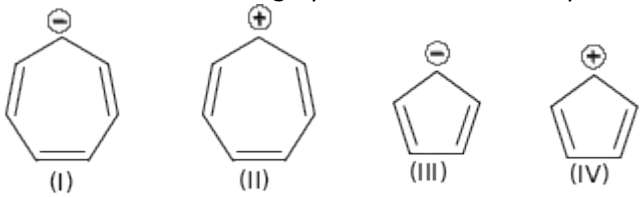
39. The compound used as refrigerant is

(a) N_2 (b) CCl_4 (c) CF_4 (d) CF_2Cl_2

Sol: CF_2Cl_2

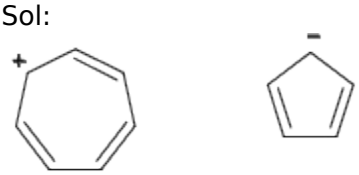
Ans: (d)

40. Which of the following species would be expected to exhibit aromatic character?



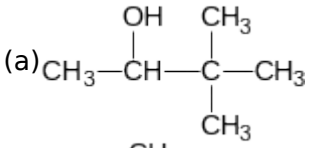
(a) I and IV (b) II and IV (c) I and III (d) II and III

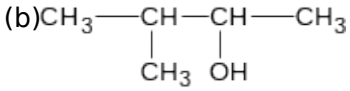
Sol:

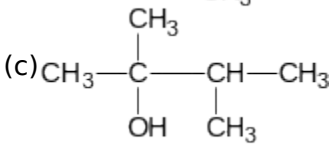


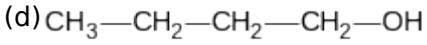
Ans: (d)

41. Which of the following alcohols will dehydrate most rapidly when treated with conc. H_2SO_4 ?

(a) 

(b) 

(c) 

(d) 

Sol: 3° carbo cation is forming

Ans: (c)

42. Select most stable complex

(a) $\left[Co(NH_3)_6\right]^{3+}$ (b) $\left[Co(NH_3)_2(en)_2\right]^{3+}$ (c) $\left[Co(NH_3)_4(en)\right]^{3+}$ (d) $\left[Co(en)_3\right]^{3+}$

Sol: Maximum chelation is responsible for stability of $\left[Co(en)_3\right]^{3+}$

Ans: (d)

43. IVth group cations are not precipitated by dil. $HCl + H_2S$ because

(a) K_{sp} of the sulphide of IVth group cations are low

(b) K_{sp} of the sulphide of IVth group cations are high

(c) K_{sp} of the sulphide of IInd group cations are high

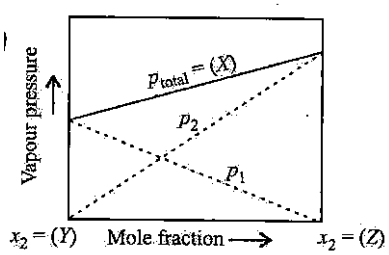
(d) sulphides of IVth group cations are water soluble

Sol: Solubility of IV group sulphide > II group sulphide

So that, it is easy to precipitate IInd group sulphide

Ans: (b)

44. Question:



X, Y and Z in the above graph are

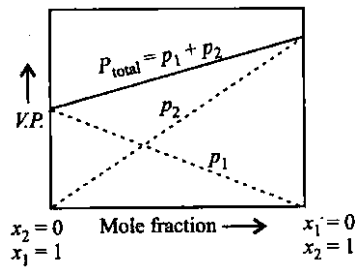
(a) $X = p_1 + p_2, Y = 1, Z = 0$

(b) $X = p_1 + p_2, Y = 0, Z = 1$

(c) $X = p_1 \times p_2, Y = 0, Z = 1$

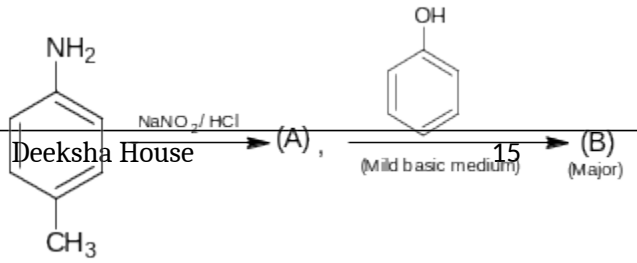
(d) None of these

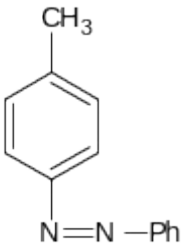
Sol:

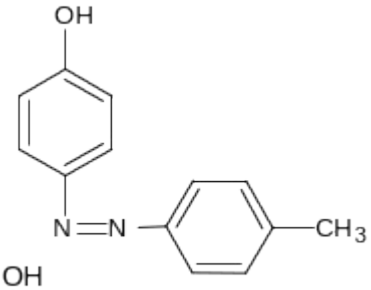


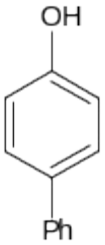
Ans: (b)

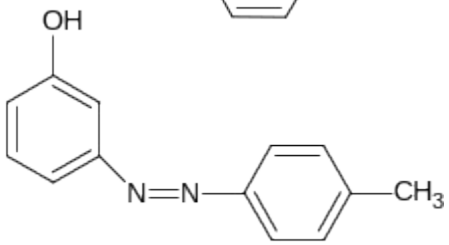
45. Product (B) of the following reaction is:



(a) 

(b) 

(c) 

(d) 

Sol: Coupling reaction takes place in para position

Ans: (b)

Physics

Multiple Choice Questions with one correct answer. A correct answer carries 4 marks. A wrong answer carries a penalty of 1 mark. 45 x 4 = 180

46. Three concentric charged metallic spherical shells A, B and C have radii a, b and c ; charge densities $\sigma, -\sigma$ and σ and potentials V_A, V_B and V_C respectively. Then which of the following relations is correct?

(a) $V_A = (a+b+c)\frac{\sigma}{\varepsilon_0}$

(b) $V_B = \left(\frac{a^2}{b}+b+c\right)\frac{\sigma}{\varepsilon_0}$

(c) $V_C = \left(\frac{a^2-b^2}{c}+c\right)\frac{\sigma}{\varepsilon_0}$

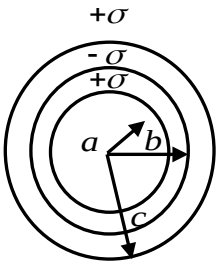
(d) $V_A = V_B = V_C = (a+b+c)\frac{\sigma}{\varepsilon_0}$

Sol: Potential due to charged shell at an outside point $= \frac{1}{4\pi\varepsilon_0}\frac{q}{r}$

where r is the distance of point from the centre of the shell while that side the shell $= \frac{1}{4\pi\varepsilon_0}\frac{q}{R}$

where R is the radius of the shell charges on the three shells are given by

$q_A = 4\pi a^2\sigma, q_B = 4\pi b^2\sigma, q_C = 4\pi c^2\sigma$



$$\therefore V_A = \frac{1}{4\pi\varepsilon_0}\left[\frac{q_A}{a}+\frac{q_B}{b}+\frac{q_C}{c}\right]$$

$$= \frac{1}{4\pi\varepsilon_0}\left[\frac{4\pi a^2\sigma}{a}-\frac{4\pi b^2\sigma}{b}+\frac{4\pi c^2\sigma}{c}\right]$$

$$= \frac{4\pi\sigma}{4\pi\varepsilon_0}[a-b+c] = \frac{\sigma}{\varepsilon_0}(a-b+c)$$

$$\therefore V_B = \frac{1}{4\pi\varepsilon_0}\left[\frac{q_A}{b}+\frac{q_B}{b}+\frac{q_C}{c}\right]$$

$$= \frac{1}{4\pi\varepsilon_0}\left[\frac{4\pi a^2\sigma}{b}-\frac{4\pi b^2\sigma}{b}+\frac{4\pi c^2\sigma}{c}\right]$$

$$= \frac{4\pi\sigma}{4\pi\varepsilon_0}\left[\frac{a^2}{b}-b+c\right] = \frac{\sigma}{\varepsilon_0}\left(\frac{a^2}{b}-b+c\right)$$

$$\therefore V_C = \frac{1}{4\pi\varepsilon_0}\left[\frac{q_A}{b}+\frac{q_B}{b}+\frac{q_C}{c}\right]$$

$$=\frac{1}{4\pi\varepsilon_0}\left[\frac{4\pi a^2\sigma}{c}-\frac{4\pi b^2\sigma}{c}+\frac{4\pi c^2\sigma}{c}\right]$$

$$=\frac{4\pi\sigma}{4\pi\varepsilon_0}\left[\frac{a^2}{c}-\frac{b^2}{c}+c\right]$$

$$=\frac{\sigma}{\varepsilon_0}\left(\frac{a^2-b^2}{c}+c\right)$$

Ans: (c)

47. A mass of 0.5 kg moving with a speed of $1.5\,\text{m/s}$ on a horizontal smooth surface, collides with a nerarly weightless spring of force constant $k=50\,\text{N/m}$. The maximum compression of the spring would be

(a) $0.5\,\text{m}$ (b) $0.15\,\text{m}$ (c) $0.12\,\text{m}$ (d) $1.5\,\text{m}$

Sol: $\frac{1}{2}mv^2=\frac{1}{2}kx^2\Rightarrow mv^2=kx^2$ or $0.5\times(1.5)^2=50\times x^2$

$\therefore\quad x=0.15\,\text{m}$

Ans: (b)

48. In Young's experiment the wavelength of red light is $7.5\times10^{-5}\,\text{cm}$ and that of blue light $5.0\times10^{-5}\,\text{cm}$. The value of n for which $(n+1)th$ blue bright band coincides with nth red band is

(a) 8 (b) 4 (c) 2 (d) 1

Sol: $n_1\lambda_1=n_2\lambda_2$

$$n\times\left(7.5\times10^{-5}\right)=(n+1)\left(5.0\times10^{-5}\right)$$

$$2.5\times10^{-5}\text{n}=5.0\times10^{-5}$$

$$n=\frac{5.0}{2.5}=2$$

Ans: (c)

49. The earth is assumed to be a sphere of radius $R.$ A platform is arranged at a height R from the surface of the earth. The escape velocity of a body from this platform is fv_e, where v_e is its escape velocity from the surface of the earth, the value of f is

(a) $\frac{1}{2}$ (b) $\sqrt{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) $\frac{1}{3}$

Sol: The escape velocity of the body from the platform at a height h above earth is equal to its binding energy

$$\frac{1}{2}m(v_e')^2 = \frac{GMm}{(R+h)}$$

or $$v_e' = \sqrt{\left(\frac{2GM}{R+h}\right)} = \sqrt{\left(\frac{2GM}{2R}\right)} \quad (\because h = R)$$

On earth surface $$v_e = \sqrt{\left(\frac{2GM}{R}\right)}$$

Given that $v_e' = f(v_e)$

$$f = \frac{1}{\sqrt{2}}$$

Ans: (c)

50. The bulk modulus of a spherical object is $'B'$. If it is subjected to uniform pressure $'p'$, the fractional decrease in radius is :

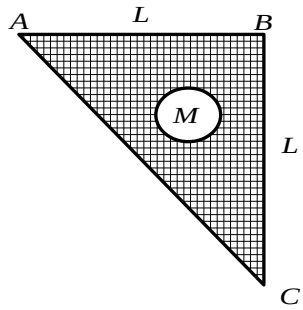
(a) $\frac{B}{3p}$ (b) $\frac{3p}{B}$ (c) $\frac{p}{3B}$ (d) $\frac{p}{B}$

Sol: $$B = \frac{\Delta P}{-\frac{\Delta V}{V}}, \frac{\Delta V}{V} = \frac{3\Delta R}{R}$$

$$B = \frac{\Delta P}{\frac{-3\Delta R}{R}} \Rightarrow -\frac{\Delta R}{R} = \frac{P}{3B} \quad (\because \Delta P = P)$$

Ans: (c)

51. Figure shows a thin metallic triangular sheet ABC. The sides AB and BC are equal of length L. The mass of the sheet is M. The moment of inertia of the sheet about AC is



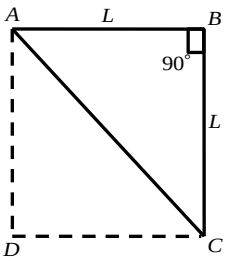
(a) $\frac{ML^2}{8}$ (b) $\frac{ML^2}{12}$ (c) $\frac{ML^2}{6}$ (d) $\frac{ML^2}{4}$

Sol:

The moment of inertia of ABC about AC

$=\frac{1}{2}$ moment of inertia of $ABCD$ about AC

$=\frac{1}{2}[2m]\frac{L^2}{12}=\frac{ML^2}{12}$



Ans: (b)

52. ε_0 and μ_0 are the electric permittivity and magnetic permeability of free space respectively. If the corresponding quantities of a medium are $2\varepsilon_0$ and $1.5\mu_0$ respectively, the refractive index of the medium will nearly be:

(a) $\sqrt{2}$ (b) $\sqrt{3}$ (c) 3 (d) 2

Sol: $\mu=\frac{C}{V}=\frac{\frac{1}{\sqrt{\mu_0\varepsilon_0}}}{\frac{1}{\sqrt{1.5\mu_0\times 2\varepsilon_0}}}=\sqrt{3}$

Ans: (b)

53. If velocity of light c, gravitational constant G and Planck's constant h are chosen as fundamental units, then the dimensions of mass is

(a) $h^{1/2}c^{1/2}G^{-1/2}$ (b) $h^{-1/2}c^{1/2}G^{1/2}$ (c) $h^{1/2}c^{-1/2}G^{1/2}$ (d) $h^{1/2}c^{1/2}G^{1/2}$

Sol: $[G]=\frac{[F][r^2]}{[m_1][m_2]}=\frac{[MLT^{-2}][L^2]}{[M][M]}$

$=[M^{-1}L^3T^{-2}]$

$[h]=\frac{[E]}{[v]}=\frac{[ML^2T^{-2}]}{[T^{-1}]}$

$=[ML^2T^{-1}]$

$[c]=[LT^{-1}]$

$\therefore \quad \left[\frac{hc}{G}\right]=[M^2]$

or $[M]=[h^{1/2}C^{1/2}G^{-1/2}]$

Ans: (a)

54. When a metallic surface is illuminated with radiation of wavelength λ, the stopping potential is V. If the same surface is illuminated with radiation of wavelength 2λ, the stopping potential is $\frac{V}{4}$. The threshold wavelength for the metallic surface is

(a) $\frac{5}{2}\lambda$ (b) 3λ (c) 4λ (d) 5λ

Sol: According to Einstein's photoelectric effect, $eV = \frac{hc}{\lambda} - \frac{hc}{\lambda_0}$ .....(1)

$e\frac{V}{4} = \frac{hc}{2\lambda} - \frac{hc}{\lambda_0}$ .....(2)

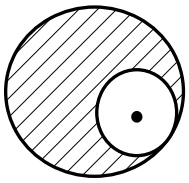
Dividing equation (i) by (ii) by,

$$4 = \frac{\frac{1}{\lambda} - \frac{1}{\lambda_0}}{\frac{1}{2\lambda} - \frac{1}{\lambda_0}}$$

$\Rightarrow \lambda_0 = 3\lambda$

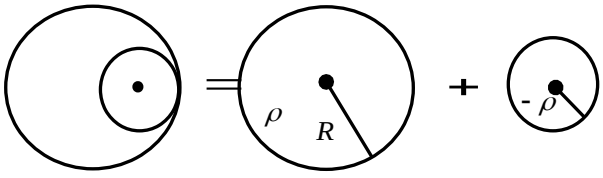
Ans: (b)

55. From a solid sphere of mass M and radius R, a spherical portion of radius $\frac{R}{2}$ is removed, as shown in the figure. Taking gravitational potential $V = 0$ at $r = \infty$, the potential at the centre of the cavity thus formed is (G = Gravitational constant)



(a) $\frac{-GM}{2R}$ (b) $\frac{-GM}{R}$ (c) $\frac{-2GM}{3R}$ (d) $\frac{-2GM}{R}$

Sol:



Potential at internal point of solid sphere at a distance r

$V = -\frac{GM}{R}\left[\frac{3}{2} - \frac{r^2}{2R^2}\right]$ ... (1)

Further, at $r = \frac{R}{2}$

$$V_1 = -\frac{GM}{R}\left[\frac{3}{2} - \frac{R^2}{8R^2}\right] = \frac{11}{8}\frac{GM}{R} \quad \ldots (2)$$

When sphere is removed,

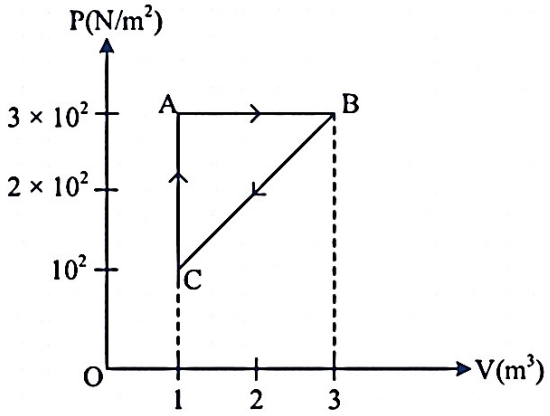
$$V_2 = \frac{3}{2}\cdot\frac{\frac{GM}{8}}{\frac{R}{2}} = \frac{3}{8}\frac{GM}{R} \quad \ldots (3)$$

The net potential V is given by

$$V = V_1 + V_2 = -\frac{11}{8}\frac{GM}{R} + \frac{3}{8}\frac{GM}{R} = -\frac{GM}{R}$$

Ans: (b)

56. For the given cycle, the work done during isobaric process is:



(a) 200 J (b) Zero (c) 400 J

(d) 600 J

Sol: AB is isobaric process

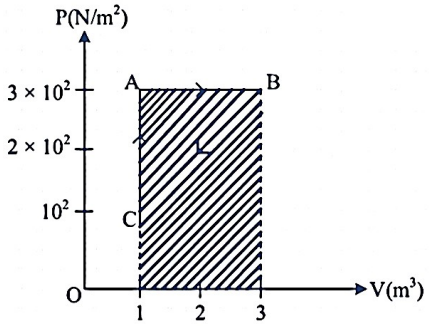
$$W_{AB} = P(V_2 - V_1)$$

$$W_{AB} = 3\times10^2(3-1)$$

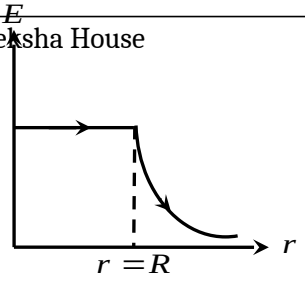
$$W_{AB} = 3\times100\times2$$

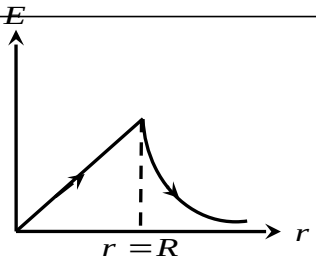
$$W_{AB} = 600\ \text{J}$$

Ans: (d)

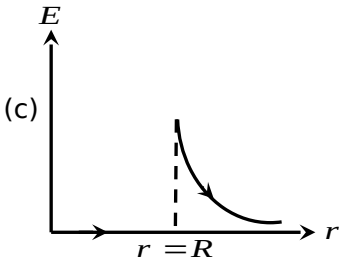


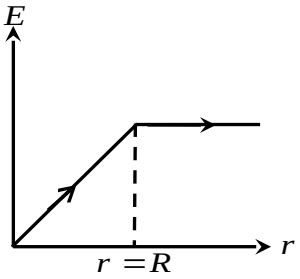
57. Which one of the following graphs represents the variation of electric field with distance r from the centre of a charged spherical conductor of radius R?





(a) (b)

(c) 

(d) 

Sol: $E_{in}=0$ and $E_{out} \propto 1/r^2$

Ans: (c)

58. Avalanche breakdown in a semiconductor diode occurs when

(a) forward current exceeds a certain value (b) reverse bias exceeds a certain value

(c) forward bias exceeds a certain value (d) the potential barrier is reduced to zero

Sol: Avalanch break down occurs when reverse bias exceed the certain value.

Ans: (b)

59. n identical cells, each of emf ε and internal resistance r, are joined to form a closed circuit. One cell (A) is joined with reverse polarity. The potential difference across each cell, except A is

(a) $\frac{2n\varepsilon}{n-2}$ (b) $\frac{(n-2)\varepsilon}{n}$ (c) $\frac{(n-1)\varepsilon}{n}$ (d) $\frac{2\varepsilon}{n}$

Sol: When one cell is wrongly connected in series, the emf of cells decreases by 2ε, but internal resistance of cells remains the same for all the cells.

Current in the circuit is $I=\frac{(n-2)\varepsilon}{nr}$

Potential difference across each cell is

$$V=\varepsilon-Ir=\varepsilon-\frac{(n-2)\varepsilon}{nr}\times r=\frac{2\varepsilon}{n}$$

Ans: (d)

60. One kilogram of ice at $0^{\circ}C$ is mixed with one kilogram of water is $80^{\circ}C$. The final temperature of mixture is (take: Specific Heat of water $=4200\,\text{J kg}^{-1}\text{K}^{-1}$, latent heat of ice $=336\,\text{kJ kg}^{-1}$

(a) $60^{\circ}C$ (b) $40^{\circ}C$ (c) $50^{\circ}C$ (d) $0^{\circ}C$

Sol: Heat needed to melt whole ice

$Q = mL = 1 \times 336 = 336kJ = 336000$ joule

Heat given by water incoming to $0^{\circ}C$

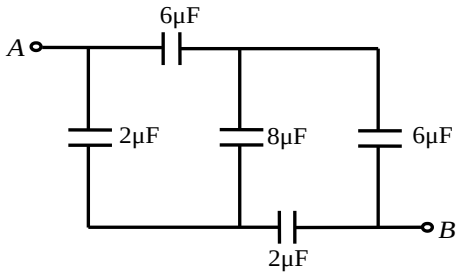
$= 1 \times 1200 \times (80 - 0) = 336000$ joule $= Q$

so, whole of the ice is melt.

Therefore, the temperature of mixture will be $0^{\circ}C$.

Ans: (d)

61. With reference to the arrangement of capacitors shown in the figure, the effective capacitance between points A and B is



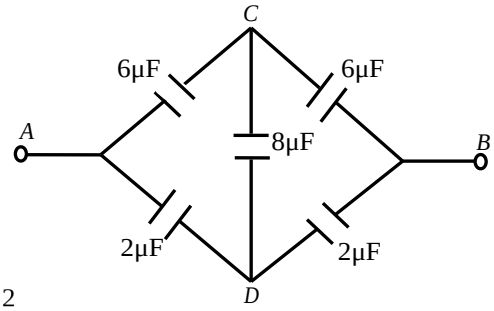
(a) $4\mu F$

(b) $\frac{8}{3}\mu F$

(c) $40\mu F$

(d) $12\mu F$

Sol: The equivalent circuit diagram of the given circuit is as shown in the figure.



$\frac{6}{6} = \frac{2}{2}$

Wheatstone bridge is balanced. So, $8\mu F$ becomes ineffective. Capacitance of the upper arm is

$\frac{1}{C_1} = \frac{1}{6} + \frac{1}{6}$ or $C_1 = 3\mu F$

Capacitance of the lower arm is $\frac{1}{C_2}=\frac{1}{2}+\frac{1}{2}$ or $C_2=1\mu F$

The effective capacitance between points A and B

us $C_{eq}=C_1+C_2=3\mu F+1\mu F=4\mu F$

Ans: (a)

62. If an electron in a hydrogen atom jumps from the 3rd orbit to the 2nd orbit, it emits a photon of wavelength λ. When it jumps from the 4th orbit to the 3rd orbit, the corresponding wavelength of the photon will be

(a) $\frac{16}{25}\lambda$ (b) $\frac{9}{16}\lambda$ (c) $\frac{20}{7}\lambda$ (d) $\frac{20}{13}\lambda$

Sol: When electron jumps from higher orbit to lower orbit then, wavelength of emitted photon is given by, $=R\left[\frac{1}{n_f^2}-\frac{1}{n_i^2}\right]$

On jumping from 3rd orbit to 2nd orbit,

$$\frac{1}{\lambda}=R\left(\frac{1}{2^2}-\frac{1}{3^2}\right)=\frac{5R}{36}$$

On jumping from 4th orbit to 3rd orbit,

$$\frac{1}{\lambda'}=R\left(\frac{1}{3^2}-\frac{1}{4^2}\right)=\frac{7R}{144}$$

$$\therefore \lambda'=\frac{144}{7}\times\frac{5\lambda}{36}=\frac{20\lambda}{7}$$

Ans: (c)

63. An object is tied to a string and rotated in a vertical circle of radius r. Constant speed is maintained along the trajectory. If $T_{\max}/T_{\min}=2,$ then $v^2/(rg)$ is

(a) 1 (b) 2 (c) 3 (d) $\frac{1}{3}$

Sol: At highest point, $\frac{mv^2}{r}=T_H+mg$ ...(i)

At lowest point, $\frac{mv^2}{r}=T_L-mg$ ...(ii)

$\frac{T_{\max.}}{T_{\min.}}=\frac{T_L}{T_H}=2$ or $T_L=2T_H$ ...(iii)

From eqn. (i) and (ii), we get

$T_H + mg = 2T_H - mg$

or $T_H = 2mg$ ...(iv)

From eq. (i), $\frac{mv^2}{r} = 2mg + mg = 3mg$ or $\frac{v^2}{rg} = 3$

Ans: (c)

64. During an experiment an ideal gas is found to obey on additional law $P^2V =$constant. The gas is initially at temperature T and volume V, when it expands to volume $2V$. The resulting temperature is

(a) $T/2$ (b) $2T$ (c) $\sqrt{2}T$ (d) $T/\sqrt{2}$

Sol: Given $P^2V =$constant

We know that $pV = RT =$constant or $p = [RT/V]$

$\therefore V\left(\frac{RT}{V}\right)^2 =$ constant

or $\frac{R^2T^2}{V} =$ constant or $\frac{T^2}{V} =$ Constant

Now $\frac{T^2}{V} = \frac{(T')^2}{2V}$ or $[T']^2 = 2T^2$

or $T' = \sqrt{2}T$

Ans: (c)

65. A rectangular coil of 100 turns and size $0.1\text{m} \times 0.05\text{m}$ is placed perpendicular to a magnetic field of 0.1T. The induced e.m.f when the field drops to 0.05 T in 0.05 s is

(a) 0.5 V (b) 1.0 V (c) 1.5 V (d) 2.0

Sol: Area of the coil $= 0.1 \times 0.05 = 5 \times 10^{-3} m^2$

Change in magnetic flux $= 0.05 - 0.1 = -0.05$ T $\therefore$ Change in flux $= -0.05 \times (5 \times 10^{-3})$

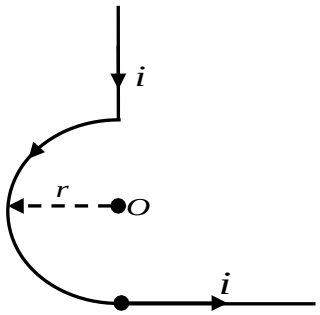
$= -0.25 \times 10^{-3} Wb.$

Now $e = -\frac{d\phi}{dt} = \frac{0.25 \times 10^{-3}}{0.05} = 5 \times 10^{-3}$ V.

Induced e.m.f for 100 turns $= 100 \times (5 \times 10^{-3}) = 0.5$ V.

Ans: (a)

66. In the following figure what is the magnitude of magnetic field induction at point O?



(a) $\frac{\mu_0 i}{4\pi r}$ (b) $\frac{\mu_0 i}{4r}+\frac{\mu_0 i}{2\pi r}$ (c) $\frac{\mu_0 i}{4r}+\frac{\mu_0 i}{4\pi r}$ (d) $\frac{\mu_0 i}{4r}-\frac{\mu_0 i}{4\pi r}$

Sol: B at O will be due to the following portions :

(i) vertical straight portion. This is zero.

(ii) circular portion. This is given by

$$B_{\text{circular}}=\frac{1}{2}\frac{\mu_0 i}{2r}=\frac{\mu_0 i}{4r}$$

(iii) straight horizontal portion. This is given by

$$B_{\text{straight}}=\frac{\mu_0 i}{4\pi r}$$

$$\therefore B_{\text{Total}}=\frac{\mu_0 i}{4r}+\frac{\mu_0 i}{4\pi r}$$

Ans: (c)

67. What should be the maximum acceptance angle at the air-core interface of an optical fibre if n_1 and n_2 are the refractive indices of the core and the cladding, respectively?

(a) $\sin^{-1}\left(\frac{n_2}{n_1}\right)$ (b) $\sin^{-1}\sqrt{n_1^2-n_2^2}$ (c) $\left[\tan^{-1}\frac{n_2}{n_1}\right]$ (d) $\left[\tan^{-1}\frac{n_1}{n_2}\right]$

Sol: The core of acceptance angle is given by $\theta=\sin^{-1}\sqrt{\left(n_1^2-n_2^2\right)}$

Ans: (b)

68. There is a point charge q located at the centre of a cube. What is the electric flux of this point charge, through a face of the cube?

(a) $\frac{q}{\varepsilon_0}$ (b) $\frac{q}{6\varepsilon_0}$

(c) $\frac{q}{3\varepsilon_0}$ (d) it will depend upon the size of the cube

Sol: Flux $=\frac{q_{\text{enclosed}}}{\varepsilon_0}$
In a cube, there are six faces,

$\therefore$ Flux through each face $=\frac{q}{6\varepsilon_0}$

Ans: (b)

69. The kinetic energy of electrons is 10^{-20} J and the photons also have the same energy. The wavelengths associated with these particles are λ_e and λ_{ph} respectively. These wavelengths are related in the following way. (c =Velocity of light $m_e = 9\times10^{-31}$ kg)

(a) $\lambda_{ph} = \lambda_e$ (b) $\lambda_{ph} < \lambda_e$ (c) $\lambda_e/\lambda_{ph} = c$ (d) $\lambda_{ph} > \lambda_e$

Sol: For photon, $\lambda_{ph} = \frac{c}{v} = \frac{hc}{hv} = \frac{hc}{E}$

For electron, $\lambda_e = \frac{h}{m_e v} = \frac{h}{\sqrt{(2m_e E)}}$

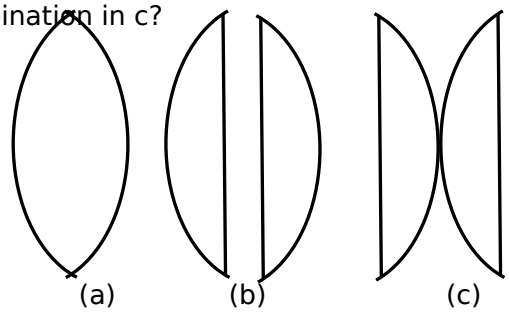
$\therefore \frac{\lambda_{ph}}{\lambda_e} = c\sqrt{\left(\frac{2m_e}{E}\right)} = 3\times10^8 \times \sqrt{\left[\frac{2\times(9\times10^{-31})}{10^{-20}}\right]}$

$\frac{\lambda_{ph}}{\lambda_e} > 1$ or $\lambda_{ph} > \lambda_e$

Ans: (d)

70. A convex lens of focal length 20 cm figure (a), is cut into two equal parts so as to obtain two plano-convex lenses as shown in figure (b). The two parts are then put in contact as shown in figure (c). What is the focal length of combination in c?

(a) 40 cm
(b) 5 cm
(c) 10 cm
(d) 20 cm



Sol: A single double convex lens may be regarded as a combination of two plano-convex lenses. Let f be focal length of each plano-convex part. Then

$\frac{1}{F}=\frac{1}{f}+\frac{1}{f}$ or $\frac{1}{20}=\frac{2}{f}$ or $f=40$ cm.

If figure again the two plano-convex lenses each of focal length 40 cm are put in contact. Now the combined focal length is given by

$\frac{1}{F'}=\frac{1}{40}+\frac{1}{40}=\frac{2}{40}=\frac{1}{20}$ or $F'=20$ cm.

Ans: (d)

71. An electron in the hydrogen atom jumps from excited state n to the ground state. The wavelength so emitted illuminates a photosensitive material having work function 2.75 eV. If the stopping potential of the photo-electron is 10V, then the value of n is

(a) 4 (b) 5 (c) 2 (d) 3

Sol: According to photoelectric equation.

$$h\nu=h\nu_0+\frac{1}{2}mv^2$$

$$h\nu=W_0+eV$$

$$E_n-E_1=W_0+eV$$

$$E_n=E_1+W_0+eV$$

$$-\frac{13.6}{n^2}=-0.85$$

$n^2=\frac{13.6}{0.85}$ or $n=4$

Ans: (a)

72. The 4th overtone of a closed organ pipe is same as that of 3rd overtone of an open pipe. The ratio of the length of the closed pipe to the length of the open pipe is:

(a) $8:9$ (b) $9:7$ (c) $9:8$ (d) $7:9$

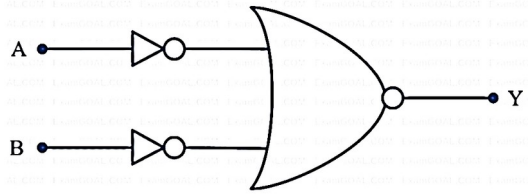
Sol: $n_{\text{closed}}=(2M+1)^{\text{th}}\text{ Har.}=(2\times4+1)\times\frac{V}{4\ell_c}=\frac{9V}{4\ell_c}$

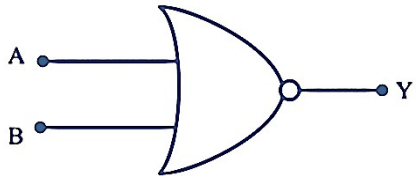
$n_{\text{oop}}=(M+1)^{\text{th}}\text{ Har.}=(3+1)\frac{V}{2\ell_0}=\frac{4V}{2\ell_0}$

Now $\frac{9V}{4\ell_c}=\frac{4V}{2\ell_0}$; $\frac{\ell_c}{\ell_0}=\frac{18}{16}=\frac{9}{8}$

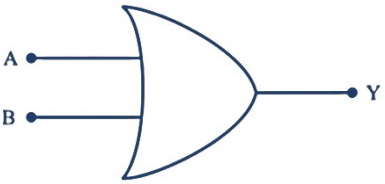
Ans: (c)

73. The given circuit is equivalent to:



(a)


(b)


(c)


(d)


Sol: $U = A + B = \overline{A.B} = A.B$

AND gate

for AND gate

Ans: (d)

74. A ball A is thrown up vertically with speed u. At the same instant another ball B is released from rest at height h. At time t, the speed of A relative to B is

(a) u (b) $u - gt$ (c) $u - 2gt$ (d) $\left(u^2 - 2gh\right)^{1/2}$

Sol: $V_A = (u - gt)\hat{j}$

$V_B = gt(-\hat{j})$

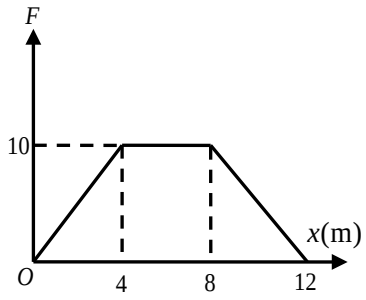
$V_{AB} = V_A - V_B$

$= (u - gt)\hat{j} + gt\hat{j}$

$= u\hat{j}$

Ans: (a)

75. A particle of mass 0.1 kg is subjected to a force which varies with distance as shown in figure. If it starts its journey from rest at $x=0$, its velocity at $x=12\text{m}$ is



(a) $0\ \text{m/s}$ (b) $20\sqrt{2}\ \text{m/s}$ (c) $20\sqrt{3}\ \text{m/s}$ (d) $40\ \text{m/s}$

Sol: The work done is equal to the area of F - x graph. Hence

$W=\frac{1}{2}\times4\times10+4\times10+\frac{1}{2}\times4\times10=80$ joule

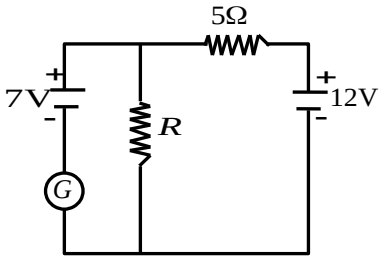
The change in velocity is equal to work done.

So, $\frac{1}{2}mv^2=W$ or $\frac{1}{2}\times0.1\times v^2=80$

or $v^2=1600$ or $v=40\,\text{m/s}$

Ans: (d)

76. For what value of R will the current in galvanometer be zero?



(a) 1Ω (b) 2Ω (c) 5Ω (d) 7Ω

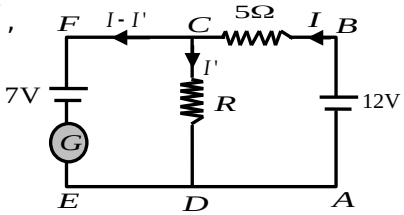
Sol: Applying Kirchhoff's second law to the closed loop $ABCDA$, we get

$-5I-I'R+12=0$ ...(i)

Again, apply Kirchhoff's second law to the closed loop $CDEFC$, we get

$-I'R+7=0$ ...(ii)

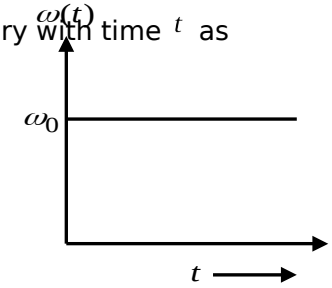
As per question $I=I'$

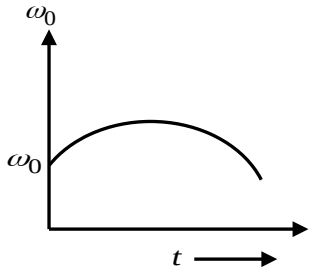


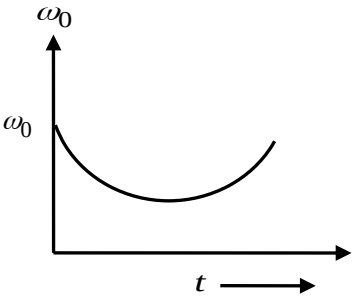
Solving equations (i), (ii) and (iii) we get $R = 7\Omega$

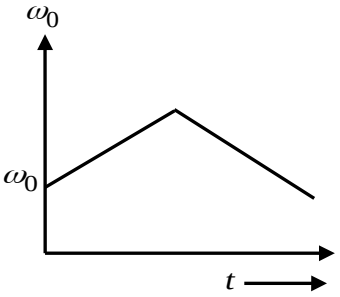
Ans: (d)

77. A circular platform is free to rotate in a horizontal plane about a vertical axis passing through its centre. A tortoise is sitting at the edge of the platform. Now, the platform is given an angular velocity ω_0. When the tortoise moves along a chord of platform with a constant velocity (with respect to the platform), the angular velocity of the platform $\omega(t)$ will vary with time t as

(a) 

(b) 

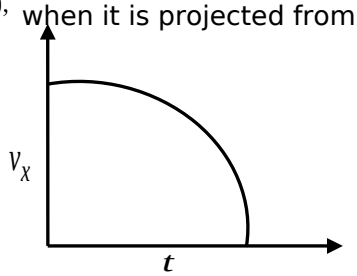
(c) 

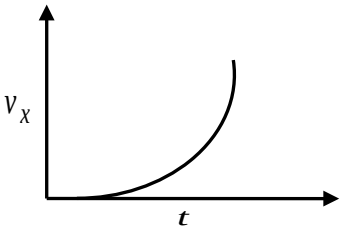
(d) 

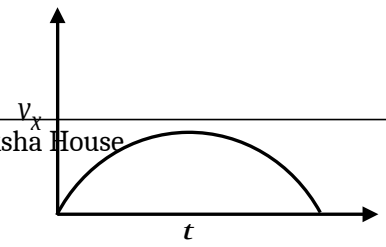
Sol: During motion along chord, the distance of tortoise from centre decreases initially and then increases. So, the moment of inertia first decreases and then increases. Hence ω initially and then decreases. Also variation in ω is non-linear.

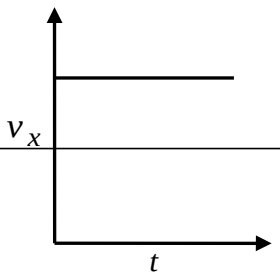
Ans: (b)

78. Which of the following is the graph between the horizontal velocity (v_x) of a projectile and time (t), when it is projected from the ground?

(a) 

(b) 





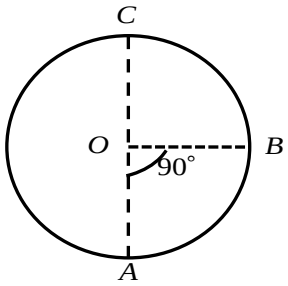
(c) (d)

Sol: In projectile motion, the graph between horizontal velocity and time is a straight line parallel to time axis because the horizontal velocity remains constant with time.

$(u_x = u\cos\theta)$, since u & θ are initial condition and are constants.

Ans: (d)

79. A particle crosses the topmost point C of a vertical circle with minimum possible speed to complete vertical circle; then the ratio of velocities at points A, B and C is



(a) $3:2:1$

(b) $5:3:1$

(c) $25:9:1$

(d) $\sqrt{5}:\sqrt{3}:\sqrt{1}$

Sol: Given that the particle crosses the topmost point C with critical speed. Hence $v_C = \sqrt{(gR)}$, where R is the radius of the circle.

Now, $v_A^2 = v_C^2 + 2g(2R)$

$= gR + 4gR = 5gR \Rightarrow v_A = \sqrt{5gR}$

$v_B = \sqrt{(3gR)}$

$\therefore \quad v_A : v_B ; v_C = \sqrt{5}:\sqrt{3}:\sqrt{1}$

Ans: (d)

80. A proton, a deuteron and an alpha particle with the same kinetic energies enter a region of uniform magnetic field moving at right angles to B. The radii of their circular paths are in the ratio.

(a) $1:1:1$ (b) $1:\sqrt{2}:1$ (c) $1:\sqrt{2}:\sqrt{2}$ (d) $1:\sqrt{2}:2$

Sol: We know that, $r = mv/Bq = \sqrt{2mK}/Bq$

where K = Kinetic energy

So, $r \propto \sqrt{m}/q$; $r_p : r_d : r_\alpha = \frac{\sqrt{m}}{e} : \frac{\sqrt{2m}}{p} : \frac{\sqrt{4m}}{2e}$

$$\therefore\ r_p : r_d : r_\alpha = \frac{\sqrt{m}}{e} : \frac{\sqrt{2m}}{e} : \frac{\sqrt{m}}{e} = 1 : \sqrt{2} : 1$$

Ans: (b)

81. The average thermal energy for a molecule monoatomic gas is: (k_B is Boltzmann constant and T absolute temperature)

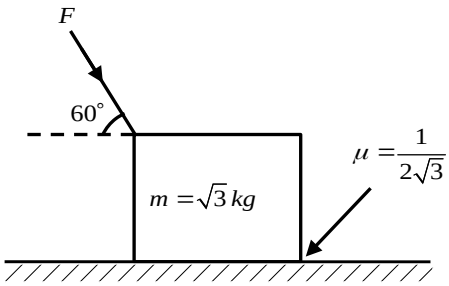
(a) $\frac{3}{2}k_BT$ (b) $\frac{5}{2}k_BT$ (c) $\frac{7}{2}k_BT$ (d) $\frac{1}{2}k_BT$

Sol: The degree of freedom for monoatomic gas is 3. So, average thermal energy per molecule,

$$K.E_{\text{avg}} = \frac{3}{2}k_BT$$

Ans: (a)

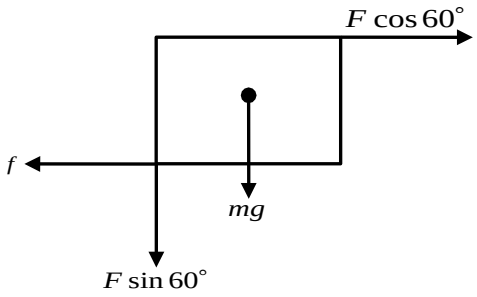
82. What is the maximum value of the force F such that the block shown in figure does not move?



(a) 20 N (b) 25 N (c) 30 N

(d) 40 N

Sol:



For no motion, $F\cos 60^\circ \le f$

where $f = \mu N = \mu(mg + F\sin 60^\circ)$

$\therefore F\cos 60^\circ \le \mu(mg + F\sin 60^\circ)$

$$\frac{F}{2} \le \frac{1}{2\sqrt{3}}\left(\sqrt{3}g + \frac{F\sqrt{3}}{2}\right)$$

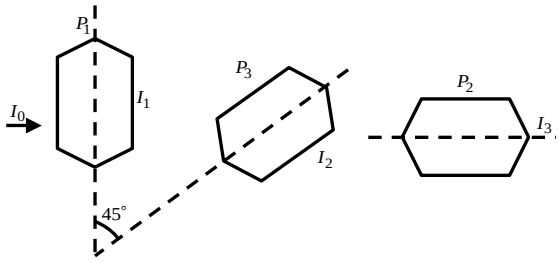
or $\frac{F}{2} \le g$ or $F_{\max} = 2g = 20N$

Ans: (a)

83. Two Polaroids P_1 and P_2 are placed with their axis perpendicular to each other. Unpolarized light I_0 is incident on P_1. A third polaroid P_3 is kept in between P_1 and P_2 such that its axis makes an angle 45° with that of the intensity of transmitted light through P_2 is :

(a) $\frac{I_0}{4}$ (b) $\frac{I_0}{8}$ (c) $\frac{I_0}{16}$ (d) $\frac{I_0}{2}$

Sol: $I_1 = \frac{I_0}{2}$



$$I_2 = \frac{I_0}{2}\cos^2 45^\circ = \frac{I_0}{4}$$

$$I_3 = \frac{I_0}{4}\cos^2 45^\circ = \frac{I_0}{8}$$

Ans: (b)

84. A man can throw a stone such that it acquires maximum horizontal range 80 m. The maximum height to which it will rise for the same projectile is

(a) 10 m (b) 20 m (c) 40 m (d) 50 m

Sol: $R_{\max} = \frac{u^2}{g} = 80 \quad (\because \theta = 45^\circ)$ or $u^2 = 800 \text{ m/s}^2$

Now, $h = \frac{u^2 \sin^2 45^\circ}{2g} = \frac{800 \times (1/2)}{2 \times 10} = \frac{400}{20} = 20$ m

Ans: (b)

85. A photon of energy 4 eV is incident on a metal surface whose work function is 2 eV. The minimum reverse potential (V) to be applied for stopping the emission of electrons is

(a) 2 volt (b) 4 volt (c) 6 volt (d) 8 volt

Sol: From photoelectric effect, $h\nu = \frac{1}{2}mv^2 + W_0$

K.E. of electron $= \frac{1}{2}mv^2 = eV$

$\therefore h\nu = eV + W_0$ or $V = (4 - 2)$ volt = 2 volt

Ans: (a)

86. A 250-turn rectangular coil of length 2.1 cm and width 1.25 cm carries a current of $85\mu A$ and subjected to a magnetic field of strength $0.85\ \mathrm{T}$. The magnitude of work done for rotating the coil by 180° against the torque is

(a) $4.55\ \mu J$ (b) $2.3\ \mu J$ (c) $1.15\ \mu J$ (d) $9.5\ \mu J$

Sol: Given: $n = 250, l = 2.1\ \mathrm{cm}, W = 1.25\ cm, i = 85\ \mu A, B = 0.85\ \mathrm{T}$

Now $W = MB(\cos\theta_1 - \cos\theta_2) = 2MB = 2(iNA)B$

$= 2 \times 85 \times 10^{-6} \times 250 \times 2.1 \times 1.25 \times 10^{-4} \times 0.85 = 9.5 \times 10^{-6}\ \mathrm{J}$

Ans: (d)

87. The Kinetic energy of a body becomes four times its initial value. The new linear momentum will be

(a) Same as the initial value (b) Twice the initial value

(c) Thrice the initial value (d) Four times the initial value

Sol: $KE \propto P^2$

$P_1 = P\sqrt{\frac{KE_2}{KE_1}} = P\sqrt{\frac{4E}{E}} = 2P$

Ans: (b)

88. An ideal fluid flows steadily in a pipe of varying cross-section. When the radius of pipe is $3R$ then velocity of fluid at that point is υ. What is the velocity of fluid at a point where its radius is R?

(a) $\frac{\upsilon}{3}$ (b) $\frac{\upsilon}{9}$ (c) 9υ (d) 3υ

Sol: $A_1\upsilon_1 = A_2\upsilon_2; \quad \pi(3R)^2\upsilon = \pi R^2\upsilon_2 \Rightarrow \upsilon_2 = 9\upsilon$

Ans: (c)

89. If the initial tension on a stretched string is doubled, then the ratio of the initial and final speeds of a transverse wave along the string is

(a) $1:1$ (b) $\sqrt{2}:1$ (c) $1:\sqrt{2}$ (d) $1:2$

Sol: We know, velocity of transverse wave

$v = \sqrt{\frac{T}{\mu}}$

$\therefore v_i = \sqrt{\frac{T}{\mu}}$ and $v_f = \sqrt{\frac{2T}{\mu}}$

$\therefore \frac{v_i}{v_f} = \frac{1}{\sqrt{2}}$

Ans: (c)

90. Two wires of the same material have diameter in the ratio 2:1 and length in the ratio 1:2. If they are stretched by the same force, their elongation will be in the ratio

(a) 8:1 (b) 1:8 (c) 2:1 (d) 1:4

Sol: $\frac{r_1}{r_2} = \frac{2}{1}; \frac{l_1}{l_2} = \frac{1}{2}$

$y = \frac{Fl}{A\Delta l}$

$\Delta l = \frac{Fl}{\pi r^2 \cdot y}$

$\Delta l \propto \frac{l}{r^2}$

$(\Delta l)_1 : (\Delta l)_2 = \frac{l_1}{r_1^2} : \frac{l_2}{r_2^2} = \frac{1}{4} : \frac{2}{1} = 1:8$

Ans: (b)

Biology

Multiple Choice Questions with one correct answer. A correct answer carries 4 marks. A wrong answer carries a penalty of 1 mark. 90 x 4 = 360

91. The aleurone layer in maize grain is specially rich in:

(a) Starch (b) Lipid (c) Auxins (d) Proteins

Sol: Proteins

Ans: (d)

92. Dwarfness can be controlled by treating the plant with

(a) cytokinin (b) gibberellic acid (c) auxin (d) antigibberellin

Sol: gibberellic acid

Ans: (b)

93. Which one of the following generates new genetic combinations leading to variation?

(a) Vegetative reproduction (b) Parthenogenesis

(c) Sexual reproduction (d) Nucellar polyembroyony

Sol: Sexual reproduction

Ans: (c)

94. The nectar is produced in the flowers that are pollinated by :

(a) wind (b) water (c) man (d) insects

Sol: insects

Ans: (d)

95. The Bt toxin protein

(a) increases the protein content (b) causes death of the insect ingesting it

(c) stops egg laying capacity of the adult (d) generate excess heat

Sol: causes death of the insect ingesting it

Ans: (b)

96. Study the four statements (A-D) given below and select the two correct ones out of them.

(A) Definition of biological species was given by Ernst Mayr.

(B) Seed coat is derived from Epicarp.

(C) Bionomial nomenclature system was given by R.H. Whittaker.

(D) Autogamy is possible in cleistogamous flowers.

(a) B and C (b) C and D (c) A and D (d) A and B

Sol: A and D

Ans: (c)

97. C_4 plants are more efficient in photosynthesis than C_3 plants due to

(a) higher leaf area

(b) presence of larger number of chloroplasts in the leaf cells

(c) presence of thin cuticle

(d) lower rate of photorespiration

Sol: lower rate of photorespiration

Ans: (d)

98. Asexual non-motile spores of phycomycetes includes

(a) Zoospores (b) Zygospore (c) Aplanospores (d) Conidiophore

Sol: Aplanospores

Ans: (c)

99. Which one of the following helps in absorption of phosphorus from soil by plants?

(a) *Glomus* (b) *Rhizobium* (c) *Frankia* (d) *Anabaena*

Sol: *Glomus*

Ans: (a)

100. Which statement is wrong for Kreb's cycle?

(a) There is one point in cycle where FAD^+ is reduced to $FADH_2$

(b) During conversion of succinyl CoA to succinic acid a molecule of GTP is synthesised.

(c) The cycle starts with condensation of acetyl group (acetyl CoA) with pyruvic acid to yield citric acid

(d) There are three points in the cycle where NAD^+ is reduced to $NADH+H^+$

Sol: The cycle starts with condensation of acetyl group (acetyl CoA) with pyruvic acid to yield citric acid

Ans: (c)

101. The hormone which reduces transpiration rate by inducing stomatal closure is

(a) IBA (b) NAA (c) ABA (d) IAA

Sol: ABA

Ans: (c)

102. Artificial system of classification is first used by

(a) Linnaeus (b) De Candolle (c) Pliny the Edler (d) Bentham and Hooker

Sol: Linnaeus

Ans: (a)

103. Read the following four statements, (i), (ii), (iii) and (iv) and select the right option having both correct statements.

Statements:

(i) Z scheme of light reaction takes place in presence of PSI only.

(ii) Only PSI is functional in cyclic photophosphorylation.

(iii) Cyclic photophosphorylation results into synthesis of ATP and $NADPH_2$.

(iv) Stroma lamellae lack PSII as well as NADP.

(a) (ii) and (iv) (b) (i) and (ii) (c) (ii) and (iii) (d) (iii) and (iv)

Sol: (ii) and (iv)

Ans: (a)

104. In Fabaceae, essential organs are enclosed by

(a) standard petal (b) Wings (c) Keel petals (d) Alae

Sol: Keel petals

Ans: (c)

105. Both, autogamy and geitonogamy are prevented in

(a) papaya (b) cucumber (c) castor (d) maize

Sol: papaya

Ans: (a)

106. Which one of the following differentiates plant cells from animal cells?

(a) Large vacuole, plastid and cell wall (b) Cell wall, plastid and ribosome

(c) Cell wall, plastid and mitochondria (d) Cell membrane, plastid and cell wall

Sol: Large vacuole, plastid and cell wall

Ans: (a)

107. Number of histone molecules in each nucleosome core is

(a) 14 (b) 12 (c) 10 (d) 8

Sol: 8

Ans: (d)

108. The cells without nucleus are

(a) Mature erythrocytes of many mammals (b) sieve tubes of plants

(c) meristematic cells (d) Both (a) and (b)

Sol: Both (a) and (b)

Ans: (d)

109. Androecium with Numerous stamens, Monadelphous, filaments are fused to form a staminal tube, epipetalous, anther monothecous and unilocular is the characteristic feature of the family

(a) Asteraceae (b) Malvaceae (c) Fabaceae (d) Solanaceae

Sol: Malvaceae

Ans: (b)

110. Sequence of AAT GCT TAG GCA on template segment of DNA will be represented over the transcribed mRNA as

(a) UUA CGT TUC CGU (b) AAT GCT AAG GCA

(c) UUA CGA AUC CGU (d) TTA CGA ATC CGT

Sol: UUA CGA AUC CGU

Ans: (c)

111. In a chloroplast the highest number of protons produced by the splitting of water are found in

(a) intermembrane space (b) antennae complex

(c) stroma (d) lumen of thylakoids

Sol: lumen of thylakoids

Ans: (d)

112. Albuminous seeds store their reserve food mainly in

(a) endosperm (b) cotyledons (c) hypocotyl (d) perisperm

Sol: endosperm

Ans: (a)

113. Inflorescence is racemose in

(a) brinjal (b) tulip (c) aloe (d) soyabean

Sol: soyabean

Ans: (d)

114. Which one of the following pairs of codons is correctly matched with their function or the signal for the particular amino acid?

(a) AUG, ACG – Start codon/methionine (b) UUA, UCA – Leucine

(c) GUU, GCU - Alanine (d) UAG, UGA – Stop codon

Sol: UAG, UGA – Stop codon

Ans: (d)

115. The core of a cilium or the flagellum is called the

(a) microtubule (b) axoneme (c) hub (d) none of these

Sol: axoneme

Ans: (b)

116. According to Singer and Nicolson concept, cell membrane is

(a) solid (b) quasi-fluid (c) fluid (d) solidified sheath.

Sol: quasi-fluid

Ans: (b)

117. Deuteromycetes are called fungi imperfecti due to

(a) Lack asexual reproduction (b) Lack of cell wall

(c) Lack of sexual reproduction (d) Lack of vacuoles

Sol: Lack of sexual reproduction

Ans: (c)

118. When a recombinant DNA is inserted within the coding sequence of an enzyme β – galatosidase, it results into inactivation of the gene producing the enzymes, this is called :

(a) Insert inactivation (b) Insertional inactivation

(c) Insertional activation (d) None of the above

Sol: Insertional inactivation

Ans: (b)

119. Elaioplast contains

(a) Proteins and fats and oils. (b) Fats and starch (c) Fats and oils (d) Fats, Protein

Sol: Fats and oils

Ans: (c)

120. The oxidation of one $NADH_2$ yields

(a) 38 ATP (b) 3 ATP (c) 2 ATP (d) 1 ATP

Sol: 3 ATP

Ans: (b)

121. Select the mismatch.

(a) *Cycas* - Dioecious

(b) *Salvinia* - Heterosporous

(c) *Equisetum* - Homosporous

(d) *Pinus* - Dioecious

Sol: *Pinus* - Dioecious

Ans: (d)

122. The population with interaction represented by '+' and '-' refers to

(a) Mutualism (b) Amensalism (c) Commensalism (d) Parasitism

Sol: Parasitism

Ans: (d)

123. Vacuole in a plant cell

(a) lacks membrane and contains air

(b) lacks membrane and contains water and excretory substances

(c) is membrane-bound and contains storage proteins and lipids

(d) is membrane bound and contains water and excretory substances

Sol: is membrane bound and contains water and excretory substances

Ans: (d)

124. In mitochondria, for each ATP produced, $4H^+$ passes through F_0 from the ---------- to the

matrix down the electrochemical proton gradient

(a) outer membrane (b) inner membrane

(c) intermembrane space (d) matrix

Sol: intermembrane space

Ans: (c)

125. What is common in all the three, *Funaria, Dryopteris* and *Ginkgo*?

(a) Presence of archegonia (b) Well developed vascular tissues

(c) Independent gametophyte (d) Independent sporophyte

Sol: Presence of archegonia

Ans: (a)

126. Which of the following is a primary consumer in maize field ecosystem?

(a) Grasshopper (b) Wolf (c) Phytoplankton (d) Lion

Sol: Grasshopper

Ans: (a)

127. The enzymes that are capable of digesting carbohydrates, proteins, lipids and nucleic acids are found in

(a) Ribosomes (b) Lysosomes (c) Nucleosomes (d) Chromosomes

Sol: Lysosomes

Ans: (b)

128. Which one of the following processes during decomposition is correctly described?

(a) Catabolism - Last step in the decomposition under fully anaerobic condition

(b) Leaching - water soluble inorganic nutrients rise to the top layers of soil

(c) Fragmentation - Carried out by organisms such as earthworm

(d) Humification - Leads to the accumulation of a dark coloured substance humus which undergoes microbial action at a very fast rate

Sol: Fragmentation - Carried out by organisms such as earthworm

Ans: (c)

129. In _____ the male and the female gametophytes do not have an independent free living existence.

(a) Bryophytes (b) Pteridophytes (c) Gymnosperms (d) All of these

Sol: Gymnosperms

Ans: (c)

130. Which of the metabolites is common to respiration-mediated breakdown of fats, carbohydrates and proteins?

(a) Pyruvic acid (b) Acetyl CoA

(c) Glucose-6-phosphate (d) Fructose 1,6-bisphophate

Sol: Acetyl CoA

Ans: (b)

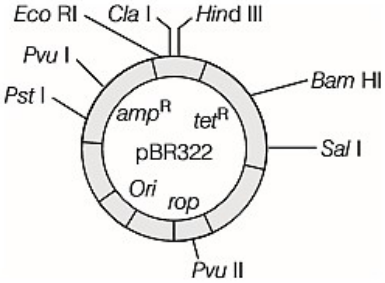
131. Population growth-curve is sigmoid, if the growth pattern is:

(a) Logistic (b) Geometric (c) Exponential (d) Accretionary

Sol: Logistic

Ans: (a)

132. The given figure is the diagrammatic representation of the *E. coli* vector pBR322. Which one of the given options correctly identifies its certain component (s)?



(a) *ori*-original restriction enzyme (b) *rop*-reduced osmotic pressure

(c) *Hind* III, *Eco*R I - selectable markers (d) amp^R, tet^R-antibiotic resistance genes

Sol: amp^R, tet^R-antibiotic resistance genes

Ans: (d)

133. The mass of living material at a trophic level at a particular time is called

(a) Standing crop (b) Standing state

(c) Net primary productivity (d) Gross primary productivity

Sol: Standing crop

Ans: (a)

134. Which one of the following statements about genetically engineered insulin is incorrect.

(a) E.coli is used for producing humulin (b) Chains A, B were produced separately

(c) Eli lily company prepared it for first time (d) Genetically engineered insulin has C-peptide

Sol: Genetically engineered insulin has C-peptide

Ans: (d)

135. Population ecology is an important area because

(a) to know where the organism is living

(b) it links ecology to population genetics and evolution

(c) to know about geography

(d) to find the uses of organisms.

Sol: it links ecology to population genetics and evolution

Ans: (b)

136. Match the stages of meiosis in column I to their characteristic features in column II and select the correct option using the codes given below.

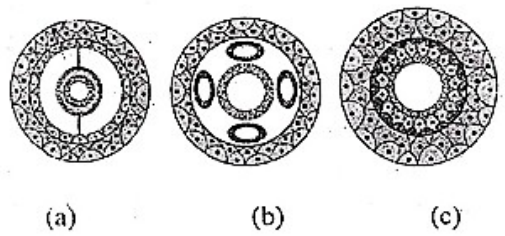
Column I		Column II	
A.	Pachytene	(i)	Pairing of homologous chromosomes
B.	Metaphase I	(ii)	Terminalisation of chiasmata
C.	Diakinesis	(iii)	Crossing-over takes place
D.	Zygotene	(iv)	Chromosomes align at equatorial plate

(a) A-(iii), B-(iv), C-(ii), D-(i)
(b) A-(i), B-(iv), C-(ii), D-(iii)
(c) A-(ii), B-(iv), C-(iii), D-(i)
(d) A-(iv), B-(iii), C-(ii), D-(i)

Sol: A-(iii), B-(iv), C-(ii), D-(i)

Ans: (a)

137. Question:



These are diagrammatic sectional view of:-

	a	**b**	**c**
(a)	*Taenia*	*Ascaris*	*Neries*
(b)	*Asterias*	*pila*	*Wuchereria*
(c)	*Locusta*	*Ancylostoma*	*Fasciola*
(d)	*Ctenoplana*	*Pheretima*	*Sepia*

Sol:

a	**b**	**c**
Locusta	*Ancylostoma*	*Fasciola*

Ans: (c)

138. Read the following statements and find out the incorrect statements.

(A) Blood is a loose connective tissue consisting of a fluid matrix, plasma and formed elements.

(B) Plasma is a straw coloured, viscous fluid constituting nearly 90-92 percent of the blood.

(C) 55 percent of plasma is water and proteins contribute 6-8 percent of it.

(D) Fibrinogen is needed for clotting or coagulation of blood.

(E) Factors for clotting of blood are present in the plasma in an inactive form.

(a) A, B, and C (b) B, C and D (c) C, D and E (d) A, B, and E

Sol: A, B, and C

Ans: (a)

139. If for some reason, the vasa efferentia in the human reproductive system get blocked, the gametes will not be transported from

(a) testes to epididymis (b) epididymis to vas deferens

(c) ovary to uterus (d) vagina to uterus

Sol: testes to epididymis

Ans: (a)

140. How many of the following show vivipary?

Pteropus, Camelus, Delphinus,Macropus, Ornithorhynchus, Neophron, Aptenodytes, Rattus, Equus

(a) 6 (b) 5 (c) 8 (d) 9

Sol: 6

Ans: (a)

141. The genotypes of a husband and wife are I^AI^B and I^Ai. Among the blood types of their children, how many different genotypes and phenotypes are possible

(a) 3 genotypes; 4 phenotypes

(b) 4 genotypes; 3 phenotypes

(c) 4 genotypes; 4 phenotypes

(d) 3 genotypes; 3 phenotypes

Sol: 4 genotypes; 3 phenotypes

Ans: (b)

142. Which of the following statements is correct in relation to the endocrine system?

(a) Non-nutrient chemicals produced by the body in trace amounts that act as intercellular messenger are known as hormones.

(b) Releasing and inhibitory hormones are produced by the pituitary gland.

(c) Adenohypophysis is under direct neural regulation of the hypothalamus.

(d) Organs in the body like gastrointestinal tract, heart, kidney and liver do not produce any hormones.

Sol: Non-nutrient chemicals produced by the body in trace amounts that act as intercellular messenger are known as hormones.

Ans: (a)

143. Which of the following statements regarding the evolution of plants and animals are correct?

(I) Amphibians evolved into reptiles

(II) Fish with stout and strong fins could move on land and go back to water. This was about 350 million years ago

(III) Giant ferns fell to form coal deposits slowly

(IV) The first mammals were like shrews

The correct combination is

(a) I and II only (b) II and III only (c) I and IV only (d) I, II, III and IV

Sol: I, II, III and IV

Ans: (d)

144. Which set has the two members of the same phylum?

(a) Cuttle fish and jelly fish (b) Tape worm and earthworm

(c) Dog fish and dolphin (d) Sea pen and sea hare

Sol: Dog fish and dolphin

Ans: (c)

145. Read the following statements and find out the incorrect statement.

(a) In male frog, cloaca is used to pass faecal matter, urine and sperms to the exterior

(b) There is no functional connection of ovaries and kidneys in female frog

(c) A mature female frog can lay 2500-3000 ova at a time

(d) In frog, fertilization is external and development is direct through a larval stage called tadpole

Sol: In frog, fertilization is external and development is direct through a larval stage called tadpole

Ans: (d)

146. If the molecular mass of an amino acid is 150 daltons, the molecular mass of a tripeptide will be

(a) 414 (b) 486 (c) 504 (d) 450

Sol: 414

Ans: (a)

147. Which of the following statements are correct?

(1) The hormone responsible for maintaining the diurnal rhythm of the body is secreted by a gland situated on the dorsal side of the forebrain.

(2) Exophthalmic goitre is characterized by protrusion of eyeballs, weight loss, enlargement of the thyroid gland and decreased basal metabolic rate

(3) Addison's disease occurs due to decreased production of hormones from the outer part of the adrenal gland.

(4) Hypersecretion of parathormone causes an increase in the deposition of calcium in bones.

(a) 1,2 and 3 (b) 2, 3 and 4 (c) 1 and 3 (d) 2 and 4

Sol: 1 and 3

Ans: (c)

148. A student collected various animals whose common names are as follows :-

(Devil fish, Cuttle fish, Dog fish, Star fish, Saw fish, Jelly fish, Flying fish and Silver fish)

Find out the number of animals those are not true fishes?

(a) Four (b) Three (c) Five (d) Two

Sol: Five

Ans: (c)

149. Which of the following hormones are secreted by pars distalis (find out total numbers)?

GH, PRL, MSH, FSH, LH, TSH, ACTH, ADH

(a) 4 (b) 5 (c) 6 (d) 8

Sol: 6

Ans: (c)

150. A person with blood group AB is considered as universal recipient because he has

(a) both A and B antigens on RBC but no antibodies in the plasma

(b) both A and B antibodies in the plasma

(c) no antigen on RBC and no antibody in the plasma

(d) both A and B antigens in the plasma but no antibodies

Sol: both A and B antigens on RBC but no antibodies in the plasma

Ans: (a)

151. In class mammalia, two pairs of limbs are adapted for running, climbing, burrowing, swimming and flying in respectively

(a) *Equus*, *Macaca*, *Felis*, *Delphinus* and *Pteropus*

(b) *Equus*, *Macaca*, *Rattus*, *Balaenoptera* and *Pteropus*

(c) *Canis*, *Macropus*, *Ornithorhynchus*, *Delphinus* and *Felis*

(d) *Canis*, *Macropus*, *Felis*, *Ornithorhychus* and *Macaca*

Sol: *Equus*, *Macaca*, *Rattus*, *Balaenoptera* and *Pteropus*

Ans: (b)

152. Which of the following is incorrect about the Homo habilis?

(a) It is considered to be evolved after Australopithecus

(b) It was the first hominid

(c) Cranial capacity was around $650 - 800cc$

(d) It was absolutely carnivorous

Sol: It was absolutely carnivorous

Ans: (d)

153. In the tissues, the factors favourable for the dissociation of O_2 from oxyhaemoglobin are

(A) Low pO_2 (B) High pO_2 (C) Low pCO_2

(D) High pCO_2 (E) Lower temperature (F) Higher temperature

(G) Low pH (H) High pH

(a) A, D, F, H (b) B, C, E, G (c) A, D, F, G (d) B, C, E, H

Sol: A, D, F, G

Ans: (c)

154. Select the correct statement from the ones given below.

(a) Barbiturates, when given to criminals, make them tell the truth.

(b) Morphine is often given to persons, who have undergone surgery, as a pain killer.

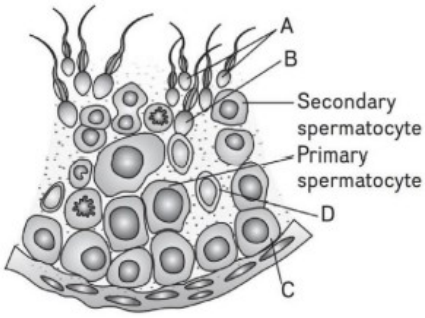
(c) Chewing tobacco lowers blood pressure and heart rate.

(d) Cocaine is given to patients after surgery as it stimulates recovery.

Sol: Morphine is often given to persons, who have undergone surgery, as a pain killer

Ans: (b)

155. Refer to the given figure showing diagrammatic sectional view of a seminiferous tubule. In the figure, some parts are labeled as A, B, C and D. Identify the part which gets activated by FSH.



(a) A (b) B (c) D (d) C

Sol: D

Ans: (c)

156. Read the following five statements about epithelial tissue (A to E) and select the option with all correct

statements:

A. Columnar epithelium is found in the walls of blood vessels and air sacs of lungs.

B. Epithelial tissue has a free surface, which faces either a body fluid or the outside environment.

C. The columnar epithelium is composed of a single layer of tall and slender cells.'

D. Squamous epithelium is commonly found in ducts of glands and tubular part of nephrons in kidneys

E. All cells in epithelium are compactly packed with little intercellular matrix.

(a) (A), (D) and (E) (b) (B), (C) and (E) (c) (A), (C) and (D) (d) (A), (B)and (D)

Sol: (B), (C) and (E)

Ans: (b)

157. Which of the following refer to correct examples(s) of organisms which have evolved due to changes in environment brought about by anthropogenic action?

(A) Darwin’s Finches of Galapagos islands

(B) Herbicide resistant weeds

(C) Drug resistant eukaryotes

(D) Man-created breeds of domesticated animals like dogs

(a) only (D) (b) only (A) (c) (A) and (C) (d) (B), (C) and (D)

Sol: (B), (C) and (D)

Ans: (d)

158. Malonate inhibits succinate dehydrogenase, is an example of

(a) Allosteric inhibition (b) Negative feedback

(c) Competitive inhibition (d) Non-competitive inhibition

Sol: Competitive inhibition

Ans: (c)

159. A decrease in plasma albumin levels is likely to affect:

(a) Clot formation (b) Oxygenation of hemoglobin

(c) Osmotic balance (d) Immune functions

Sol: Osmotic balance

Ans: (c)

160. How many diseases can be identified by karyotyping?

Klinefelter's syndrome, Phenylketonuria, Thalassemia, Alkaptonuria, Albinism, Colour blindness,

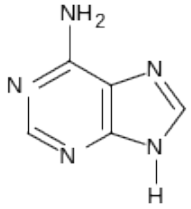
Haemophilia, Down's syndrome, Turner syndrome

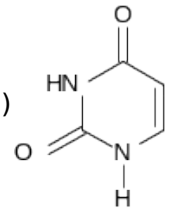
(a) 5 (b) 4 (c) 7 (d) 3

Sol: 3

Ans: (d)

161. Identify the given structural formulae and select the correct option.

(1) 

(2) 

	1	**2**
(a)	Adenine	Uracil
(b)	Guanine	Thymine
(c)	Adenine	Guanine
(d)	Cytosine	Thymine

Sol:

1	**2**
Adenine	Uracil

Ans: (a)

162. Select the true statements

(1) Expiratory Capacity is the total volume of air a person can inspire after a normal expiration

(2) Inspiratory Capacity is the total volume of air a person can expire after a normal inspiration

(3) Functional Residual Capacity is the volume of air that will remain in the lungs after a normal expiration

(4) Vital Capacity is the maximum volume of air a person can breathe in after a forced expiration

(a) (1) and (2) only (b) (2) and (3) only (c) (3) and (4) only (d) (1) and (4) only

Sol: (3) and (4) only

Ans: (c)

163. A person suffering from a disease caused by *Plasmodium*, experiences recurring chill and fever at the time when

(a) the sporozoites released from RBCs are being rapidly killed and broken down inside spleen

(b) the trophozoites reach maximum growth and give out certain toxins

(c) the parasite after its rapid multiplication inside RBCs ruptures them, releasing the state to enter fresh RBCs

(d) the microgametocytes and megagametocytes are being destroyed by the WBCs.

Sol: the parasite after its rapid multiplication inside RBCs ruptures them, releasing the state to enter fresh RBCs

Ans: (c)

164. Which of the following statements is not true?

(a) The partial pressure of oxygen in oxygenated blood is 95 mm Hg

(b) The partial pressure of oxygen in the alveolar air is 104 mm Hg

(c) The partial pressure of carbon dioxide in the alveolar air is 40 mm Hg

(d) The partial pressure of carbon dioxide in deoxygenated blood is 95 mm Hg

Sol: The partial pressure of carbon dioxide in deoxygenated blood is 95 mm Hg

Ans: (d)

165. Which one of the following correctly explains the function of a specific part of the human nephron?

(a) Podocytes: create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule

(b) Henle's loop: most reabsorption of the major substances from the glomerular filtrate

(c) Distal convoluted tubule: reabsorption of K^+ ions into the surrounding blood capillaries

(d) Afferent arteriole: carries the blood away from the glomerulus towards renal vein

Sol: Podocytes: create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule

Ans: (a)

166. Select the incorrect statement:

(a) Insulin and glucagon are peptide hormones.

(b) Insulin acts mainly on hepatocyte and adipocytes and enhance glucose uptake and utilization.

(c) Insulin stimulates glycogenesis.

(d) Glucagon inhibits the process of gluconeogenesis

Sol: Glucagon inhibits the process of gluconeogenesis

Ans: (d)

167. In sickle cell anaemia, the sequence of amino acids from first to seventh position of β - chain of haemoglobin S (HbS) is

(a) His, Leu, Thr, Pro, Glu, Val, Val

(b) Val, His, Leu, Thr, Pro, Glu, Glu

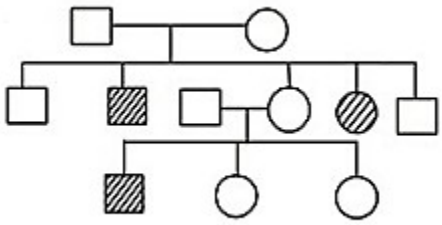
(c) Glu, His, Leu, Pro, Val, Glu, Glu

(d) Val, His, Leu, Thr, Pro, Val, Glu

Sol: Val, His, Leu, Thr, Pro, Val, Glu

Ans: (d)

168. Analyse the given pedigree chart and select the option i.e. correct regarding it



(a) Autosomal recessive trait – Sickle cell anaemia

(b) Autosomal dominant trait – Myotonic distrophy

(c) Sex linked dominant trait - Myotonic distrophy

(d) Sex linked dominant trait – Cystic fibrosis

Sol: Autosomal recessive trait – Sickle cell anaemia

Ans: (a)

169. Which of the following statements about morula in humans is correct?

(a) It has almost equal quantity of cytoplasm as an uncleaved zygote but much more DNA.

(b) It has far less cytoplasm as well as less DNA than in an uncleaved zygote.

(c) It has more or less equal quantity of cytoplasm and DNA as in uncleaved zygote.

(d) It has more cytoplasm and more DNA than an uncleaved zygote.

Sol: It has almost equal quantity of cytoplasm as an uncleaved zygote but much more DNA

Ans: (a)

170. Read the following statements about biodiversity and state the one which is false.

(a) Western Ghats have a greater amphibian species diversity than the Eastern Ghats

(b) Alpine meadows has a greater ecosystem diversity than a Scandinavian country like Norway

(c) Among animals, insects are the most species-rich taxonomic group

(d) New York has more bird species than Columbia

Sol: New York has more bird species than Columbia

Ans: (d)

171. Every 100 ml of deoxygenated blood delivers approximately

(a) 4 ml of CO_2 to the tissues (b) 4 ml of CO_2 to the alveoli

(c) 5 ml of CO_2 to the alveoli (d) 5 ml of CO_2 to the tissues

Sol: 4 ml of CO_2 to the alveoli

Ans: (b)

172. Which of the following are in situ conservation methods?

(A) Biosphere reserves (B) Hotspots (C) National parks

(D) Sacred groves (E) Wildlife sanctuaries

(a) A, B and C only (b) A, C and E only (c) A, B, C and E only (d) A, B, C, D and E

Sol: A, B, C, D and E

Ans: (d)

173. Which of the following type of joint does not allow any movement?

(a) Shoulder joint (b) Joint between parietal bone and temporal bone

(c) Joint in between carpals (d) Joint between sternum and ribs

Sol: Joint between parietal bone and temporal bone

Ans: (b)

174. Which of the following is correct about phenylketonuria?

(a) It is an example of pleiotropy (b) It is an autosomal dominant disease

(c) It is caused due to single gene mutation (d) Both (a) and (c)

Sol: Both (a) and (c)

Ans: (d)

175. Glucocorticoids do not:

(a) Stimulate gluconeogenesis
(b) Cause lipolysis
(c) Cause proteolysis
(d) Stimulate cellular uptake and utilization of amino acids

Sol: Stimulate cellular uptake and utilization of amino acids

Ans: (d)

176. Which of the following STIs are not completely curable?

(a) Chalmydiasis, gonorrhoea, trichomoniasis (b) Chancroid, syphilis, genital warts
(c) AIDS, syphilis, hepatitis B (d) AIDS, genital herpes, hepatitis B

Sol: AIDS, genital herpes, hepatitis B

Ans: (d)

177. Which is correct about joint diastole?

(1) Bicuspid and tricuspid valves are open (2) Bicuspid and tricuspid valves are closed
(3) Semilunar valves are open (4) Semilunar valves are closed

(a) (1) and (3) (b) (2) and (4) (c) (1) and (4)
(d) (2) and (3)

Sol: (1) and (4)

Ans: (c)

178. How many of the following are examples of hormones which interact with intracellular receptors?

(cortisol, testosterone, estradiol, thyroxine, insulin, epinephrine)

(a) 5 (b) 4 (c) 6 (d) 3

Sol: 4

Ans: (b)

179. During the transmission of nerve impulse through a nerve fibre the potential on the inner side of the plasma membrane has which type of electric charge?

(a) First positive then negative and continue to be negative
(b) First negative then positive and continue to be positive
(c) First positive then negative and again back to positive
(d) First negative then positive and again back to negative

Sol: First negative then positive and again back to negative

Ans: (d)

180. Identify the autoimmune disease and type of muscle involved.

(a) Myasthenia gravis, skeletal muscle (b) Myasthenia gravis, smooth muscle

(c) Muscular dystrophy, skeletal muscle muscle

(d) Muscular dystrophy, smooth

Sol: Myasthenia gravis, skeletal muscle

Ans: (a)

Key Answers:

1. d	2. a	3. d	4. b	5. a	6. b	7. b	8. b	9. b	10. c
11. a	12. d	13. b	14. b	15. d	16. b	17. d	18. c	19. a	20. d
21. a	22. c	23. c	24. a	25. c	26. b	27. a	28. b	29. a	30. c
31. d	32. d	33. d	34. b	35. b	36. b	37. c	38. d	39. d	40. d
41. c	42. d	43. b	44. b	45. b	46. c	47. b	48. c	49. c	50. c
51. b	52. b	53. a	54. b	55. b	56. d	57. c	58. b	59. d	60. d
61. a	62. c	63. c	64. c	65. a	66. c	67. b	68. b	69. d	70. d
71. a	72. c	73. d	74. a	75. d	76. d	77. b	78. d	79. d	80. b
81. a	82. a	83. b	84. b	85. a	86. d	87. b	88. c	89. c	90. b
91. d	92. b	93. c	94. d	95. b	96. c	97. d	98. c	99. a	100. c
101. c	102. a	103. a	104. c	105. a	106. a	107. d	108. d	109. b	110. c
111. d	112. a	113. d	114. d	115. b	116. b	117. c	118. b	119. c	120. b
121. d	122. d	123. d	124. c	125. a	126. a	127. b	128. c	129. c	130. b
131. a	132. d	133. a	134. d	135. b	136. a	137. c	138. a	139. a	140. a
141. b	142. a	143. d	144. c	145. d	146. a	147. c	148. c	149. c	150. a
151. b	152. d	153. c	154. b	155. c	156. b	157. d	158. c	159. c	160. d
161. a	162. c	163. c	164. d	165. a	166. d	167. d	168. a	169. a	170. d
171. b	172. d	173. b	174. d	175. d	176. d	177. c	178. b	179. d	180. a