

Subject	Topic	Mock Test - 05	Date
C + P + B	Complete Syllabus	NEET - CT	21 <sup>st</sup> May 2026
		N-20250421	

**Max. Marks: 720**

**Duration: 3 Hours**

- 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.
- The OMR sheet NEET-2026-180Q is to be used
- Use of calculators and log tables is prohibited
- 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
- No clarification will be entertained during the examination. Doubts in the paper can be reported to the coordinator after the exam
- 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:**

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

**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 number of atoms of oxygen present in 5 g of calcium carbonate is

- (a)  $3.01 \times 10^{23}$       (b)  $6.01 \times 10^{23}$       (c)  $18 \times 10^{23}$       (d)  $9 \times 10^{22}$

Sol: 1 mole  $\text{CaCO}_3 = 6.02 \times 10^{23}$  molecules  $= 3 \times 6.02 \times 10^{23}$  atoms of oxygen

In 100 gms of  $\text{CaCO}_3$  molecules number of oxygen atom  $= 3 \times 6.02 \times 10^{23}$

$\therefore$  5 gms will possess  $= \frac{3 \times 6.02 \times 10^{23}}{20} = 9.0 \times 10^{22}$  atoms of oxygen

Ans: (d)

2. Select the correct relation between azimuthal quantum number  $(l)$  and magnetic quantum number  $(m)$

- (a)  $l = \frac{m-1}{2}$       (b)  $m = l + 2$       (c)  $m = 2l^2 + 1$       (d)  $l = 2m + 1$

Sol:  $m = -l, 0, +l$ ; Values of 'm'  $= 2l + 1$

$$l = \frac{m-1}{2}$$

Ans: (a)

3. What will be the volume of  $\text{O}_2$  gas at STP which is required for complete combustion of  $7.8 \text{ g}$  acetylene ( $\text{C}_2\text{H}_2$ )?

- (a) 11.2 L      (b) 5.6 L      (c) 22.4 L      (d) 16.8 L

Sol:  $\text{C}_2\text{H}_2 + \frac{5}{2}\text{O}_2 \rightarrow 2\text{CO}_2 + \text{H}_2\text{O}$

26g      2.5 mol  
(56 L)

$$\therefore \frac{26}{7.8} = \frac{56}{x}$$



6. The pH of a 0.1 molar solution of the acid HQ is 3. The value of the ionization constant,  $K_a$  of the acid is

(a)  $3 \times 10^{-1}$                       (b)  $1 \times 10^{-3}$                       (c)  $1 \times 10^{-5}$                       (d)  $1 \times 10^{-7}$

Sol:  $HQ \rightleftharpoons H^+ + Q^-$

$[H^+] = \sqrt{K_a C}$  by Ostwald's dilution law

$[H^+] = 10^{-pH} = 10^{-3} M$

$C = 0.1 M$

Thus,  $10^{-3} = \sqrt{k_a \times 0.1}$  or  $10^{-6} = K_a \times 0.1$

$K_a = 1 \times 10^{-5}$

Ans: (c)

7. In a first order reaction, the concentration of reactant decreases from  $800 \text{ mol} / \text{dm}^3$  to  $50 \text{ mol} / \text{dm}^3$  in  $2 \times 10^4 \text{ s}$ . The rate constant of the reaction in  $\text{s}^{-1}$  is

(a)  $2 \times 10^4$                       (b)  $3.45 \times 10^{-5}$                       (c)  $1.386 \times 10^{-4}$                       (d)  $2 \times 10^{-4}$

Sol: In a first order reaction

$2^n = \frac{a}{(a-x)}$  ( $n = \text{no of half lives}$ )

$2^n = \frac{800}{50} = 16 \therefore n = 4$

$4 \frac{t_1}{2} = 2 \times 10^4$   
seconds

$\therefore \frac{t_1}{2} = 5 \times 10^3 \text{ s}$

$k = \frac{0.693}{\frac{t_1}{2}} = \frac{0.693}{5 \times 10^3} = 1.386 \times 10^{-4}$

Ans: (c)

8. The EMF of the cell  $\text{Ni} / \text{Ni}^{2+} (0.01M) // \text{Cl}^- (0.01M) / \text{Cl}_2, \text{Pt}$  is..... V if the SRP of nickel and chlorine electrodes are  $-0.25V$  and  $+1.36V$  respectively

(a)  $+1.61 V$                       (b)  $-1.61 V$                       (c)  $+1.79 V$                       (d)  $-1.79 V$

Sol: Cell reaction:  $Ni(s) + Cl_2 \rightarrow Ni^{(2+)}(aq) + 2Cl^{-}(aq)$

$$E_{cell} = E_{cell}^{\circ} - \frac{0.059}{2} \log [Ni^{2+}] [Cl^{-}]^2$$

Ans: (c)

9. What is the correct sequence of osmotic pressure of 0.01 M aq. solution of:

- (1)  $Al_2(SO_4)_3$  (2)  $Na_3PO_4$   
 (3)  $BaCl_2$  (4) Glucose  
 (a)  $\pi_4 > \pi_2 > \pi_3 > \pi_1$  (b)  $\pi_3 > \pi_4 > \pi_2 > \pi_1$  (c)  $\pi_3 > \pi_4 > \pi_1 > \pi_2$  (d)  $\pi_1 > \pi_2 > \pi_3 > \pi_4$

Sol:  $\pi = iCRT$ ;  $i = 5$  for  $Al_2(SO_4)_3$ ;  $i = 4$  for  $Na_3PO_4$

$i = 3$  for  $BaCl_2$ ;  $i = 1$  for glucose

So osmotic pressure of Glucose  $< BaCl_2 < Na_3PO_4 < Al_2(SO_4)_3$

Ans: (d)

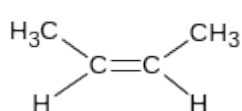
10. Which of the following are not state functions?

- (I)  $q + w$  (II)  $q$  (III)  $w$  (IV)  $H - TS$   
 (a) I, II, III (b) II & III (c) I & IV (d) II, III, IV

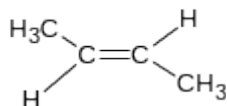
Sol:  $q$  and  $w$  are path functions, but  $(q+w)$  is state function.

Ans: (b)

11. Statement - I:

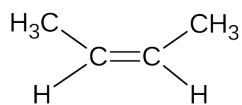


b.p = 277 K

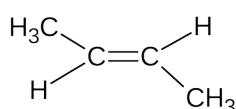


b.p = 274 K

Statement - II:



$\mu = 0.33$



$\mu \approx 0$  D

- (a) Statement I & II both are correct and statement - II is correct explanation of statement - I  
 (b) Statement I & II both are correct but statement -II is not correct explanation of statement - I

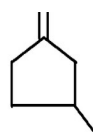
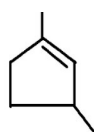
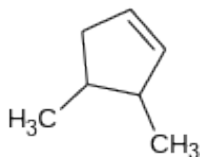
(c) Statement I is correct but statement-II is false

(d) Statement I incorrect but Statement II is correct

Sol: Statement I & II both are correct and statement - II is correct explanation of statement - I

Ans: (a)

12. How many of the following alkenes, are more stable than



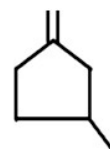
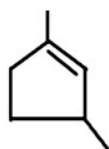
(a) 2

(b) 3

(c) 4

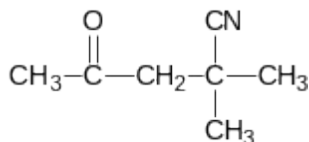
(d) 5

Sol: Based on hyperconjugation



Ans: (c)

13. The IUPAC name of the compound is



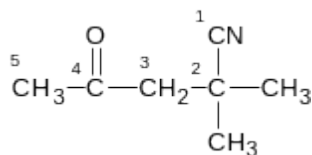
(a) 2-Cyano-2-methyl-4-oxopentane

(b) 4-Cyano-4-methyl-2-pentanone

(c) 4-Cyano-4-methyl-2-oxopentane

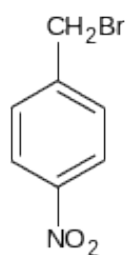
(d) 2, 2- Dimethyl-4-oxopentanenitrile

Sol:



Ans: (d)

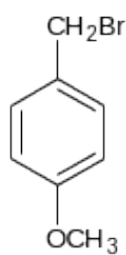
14. What is the correct order of reactivity towards  $S_N2$  reaction?



(1)

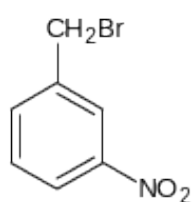
(a) 1 > 2 > 4 > 3

(d) 1 > 3 > 2 > 4

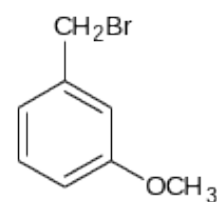


(2)

(b) 3 > 1 > 2 > 4



(3)



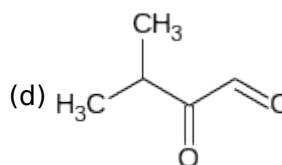
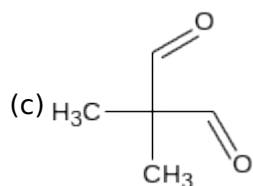
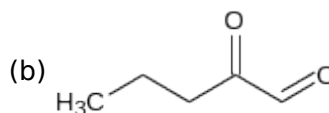
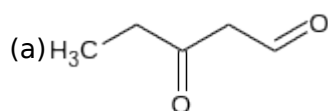
(4)

(c) 1 > 3 > 4 > 2

Sol: Presence of EWG at ortho and para will increase the electrophilicity at the benzylic carbon and hence it is more reactive towards  $S_N^2$  mechanism.

Ans: (c)

15. An organic compound X ( $C_5H_8O_2$ ) gives dioxime on treatment with hydroxyl amine. The compound X on Clemmensen's reduction gives a hydrocarbon which gives only one monochloro derivative on chlorination. The compound X can be



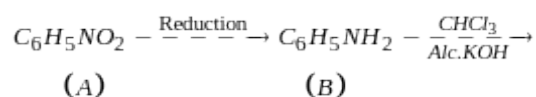
Sol: The hydrocarbon formed by (c) is neo pentane which gives only one monochloro product

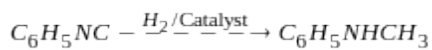
Ans: (c)

16. An organic compound (A) on reduction gives compound (B). (B) on treatment with  $CHCl_3$  and alcoholic  $KOH$  gives (C). (C) on catalytic reduction gives *N*-methylaniline. The compound A is

(a) Methylamine      (b) Nitromethane      (c) Aniline      (d) Nitrobenzene

Sol:

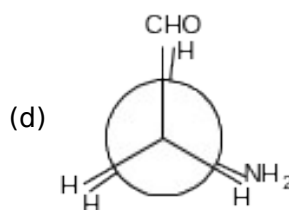
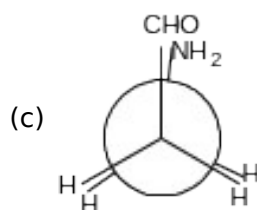
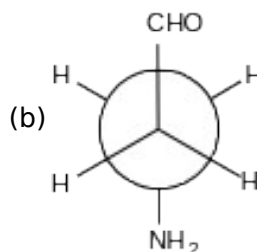
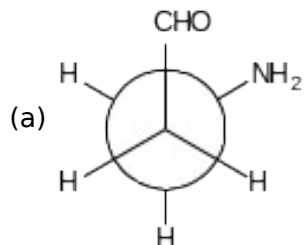




(C) N - Methylaniline

Ans: (d)

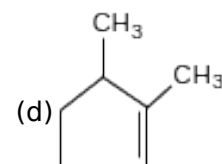
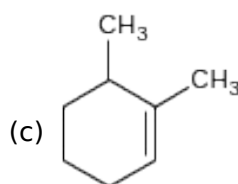
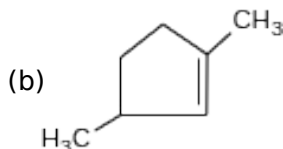
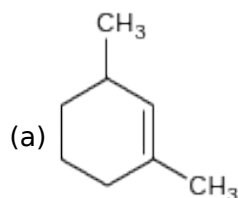
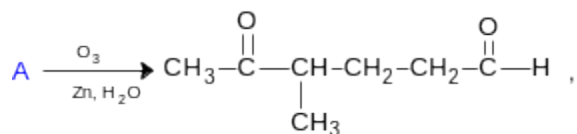
17. Which of the following is most stable?



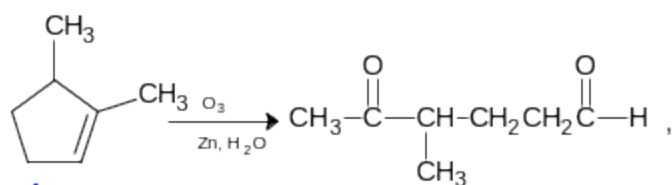
Sol: Due to intra molecular H-bonding.

Ans: (a)

18. Reactant 'A' in the reaction is



Sol:



Ans: (d)

19. Match the column:

	Column - I		Column - II
(A)	Paper Chromatography	(P)	Stationary phase is Alumina
(B)	Thin layer	(Q)	Aniline & chloroform

	chromatography		separation
(C)	Fractional distillation	(R)	Stationary phase is water
(D)	Distillation	(S)	Separation of fractions of crude oil in petroleum industry

(a) A- R, B- P, C - S, D - Q

(b) A - P, B - Q, C - R, D - S

(c) A - S, B - P, C - R, D - Q

(d) A - Q, B - P, C - S, D - R

Sol: A- R, B- P, C - S, D - Q

Ans: (a)

20. Which of the following is false?

(a) van der Waals forces are responsible for the formation of molecular crystals

(b) Branching lowers the boiling point of isomeric organic compounds due to reduction of van der Waals forces of attraction

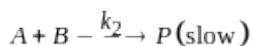
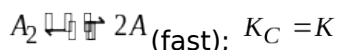
(c) In graphite, van der Waals forces act between adjacent layers containing hexagonal rings of carbon atoms

(d) Diamond has three dimensional network structure with covalent bonds

Sol: Diamond has layered structure of carbon atoms with Van der Waals forces between the carbon layers.

Ans: (d)

21. Consider the reaction mechanism



Where A is the intermediate. The rate law for the reaction is

(a)  $k_2[A][B]$

(b)  $k_2K^{1/2}[A_2]^{1/2}[B]$

(c)  $k_2K^{1/2}[A][B]$

(d)  $k_2K^{1/2}[A]^2[B]$

Sol:  $r = k_2[A][B]$

$$K = \frac{[A]^2}{[A_2]}, \quad [A]^2 = K[A_2]$$

$$[A] = K^{1/2}[A_2]^{1/2}, \quad r = K_2k^{1/2}[A_2]^{1/2}[B]$$

Ans: (b)

22. Which has maximum value of equivalent conductance, assume equal ionisation of each and identical specific conductance:

(a) 0.01 M HCl

(b) 0.01 M H<sub>2</sub>SO<sub>4</sub>

(c) 0.01 M H<sub>3</sub>PO<sub>3</sub>

(d) All have same value

Sol: Solution with minimum normality will have maximum equivalent conductance.

Ans: (a)

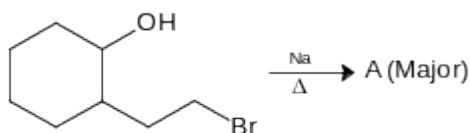
23. In which of the following molecules is hydrogen bond absent?

- (a) Water                      (b) Phenol                      (c)  $B_2H_6$                       (d) Methanol

Sol: Diborane

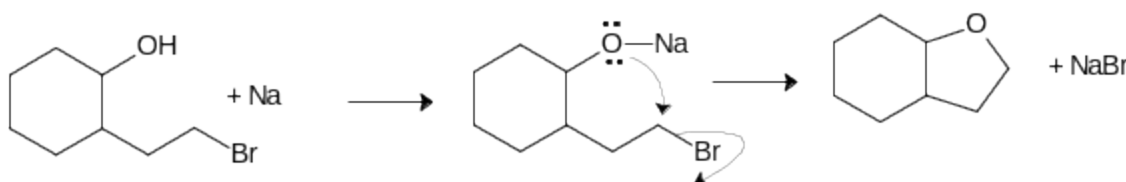
Ans: (c)

24. The product 'A' will be



- (a) (b) (c) (d)

Sol:



Ans: (c)

25. Which of the following statements concerning lanthanide elements is false?

- (a) Lanthanides are separated from one another by ion exchange method  
 (b) Ionic radii of trivalent lanthanides steadily increase with increase in the atomic number  
 (c) All lanthanides are highly dense metals  
 (d) More characteristic oxidation state of lanthanides elements is +3

Sol: The ionic radii of lanthanide elements decreases steadily with increase in atomic number due to lanthanoid contraction.

Ans: (b)

26. Which of the following statements is correct with respect to Werner's theory?

- (a) Primary valency of the transition metal ion is variable and satisfied by positive ions  
 (b) A ligand can satisfy only secondary valency of the transition metal ion  
 (c) The number of ligands bonded to the metal ion is equal to the co-ordination number of the transition metal ion.

(d) The geometry of the complex ion is due to the species which satisfy the secondary valency of transition metal ion.

Sol: Postulates of Werner theory

Ans: (d)

27. The electronic configuration of an element is  $1s^2, 2s^2, 2p^6, 3s^2, 3p^3$ . What is the atomic number of the element which is just below the above element in the periodic table?

- (a) <sup>34</sup> (b) <sup>49</sup> (c) <sup>33</sup> (d) <sup>31</sup>

Sol:  $1s^2, 2s^2, 2p^6, 3s^2, 3p^3$  At No 15 - P

$1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}, 4s^2, 4p^3$  At No 33 - As

Ans: (c)

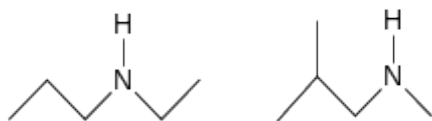
28. In the structure of  $ClF_3$ , the number of lone pair of electrons on central atom 'Cl' is

- (a) Four (b) Two (c) One  
(d) Three

Sol:  $ClF_3$  is T shaped and has two lone pair of electron.

Ans: (b)

29. Determine the relationship between the two compounds

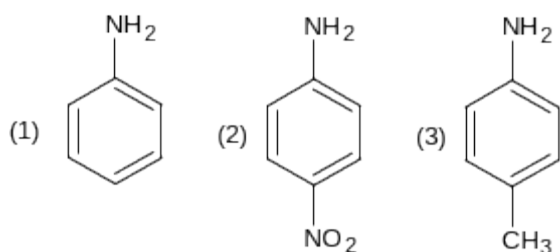


- (a) Functional Group isomers (b) Metamers  
(c) Tautomers (d) Position isomers

Sol: Metamers

Ans: (b)

30. The correct increasing order of basic strength for the following compounds is

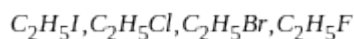


- (a)  $3 < 1 < 2$                       (b)  $3 < 2 < 1$                       (c)  $2 < 1 < 3$                       (d)  $2 < 3 < 1$

Sol:  $3 > 1 > 2$

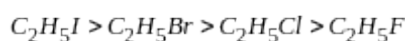
Ans: (c)

31. Arrange the following alkyl halides in order of dehydrohalogenation:



- (a)  $C_2H_5F > C_2H_5Cl > C_2H_5Br > C_2H_5I$                       (b)  $C_2H_5I > C_2H_5Br > C_2H_5Cl > C_2H_5F$   
 (c)  $C_2H_5I > C_2H_5Cl > C_2H_5Br > C_2H_5F$                       (d)  $C_2H_5F > C_2H_5I > C_2H_5Br > C_2H_5Cl$

Sol: For the same alkyl group having different halogen dehydrohalogenation decreases in the order

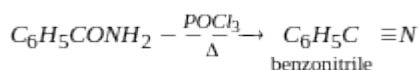


Ans: (b)

32. Benzamide on reaction with  $POCl_3$  gives

- (a) aniline                      (b) chlorobenzene                      (c) benzylamine                      (d) benzonitrile

Sol: Benzamide on reaction with  $POCl_3$  give Benzonitrile



Ans: (d)

33. Which noble gas is most abundant in atmosphere?

- (a) He                      (b) Ne                      (c) Ar                      (d) Kr

Sol: Argon is most abundant noble gas because of its stable nucleus and inert properties.

Ans: (c)

34. Pick out the correct statement with respect to  $[Mn(CN)_6]^{-3}$

- (a) It has magnetic moment due to two unpaired electrons  
 (b) It is outer orbital complex  
 (c) It is diamagnetic in Nature  
 (d) It is Heteroleptic complex

Sol:  $[Mn(CN)_6]^{-3}$

→  $d^2sp^3$  hybridised

→ Inner orbital complex

→ 2 unpaired electrons

→ Homoleptic complex

Ans: (a)

35. Which is correct IUPAC name of coordination isomer of  $[Pt(NH_3)_4][Pd(C_2O_4)_2]$  ?

- (a) Tetraamminepalladium (II) bisoxalatoplatinate (II)
- (b) Tetraammineplatinum (II) dioxalatopalladate (II)
- (c) Diammineoxalatoplatinum (II) diammineoxalatopalladate (II)
- (d) Diammineoxalatopalladium (II) diammineoxalatoplatinate (II)

Sol: Isomer of  $[Pt(NH_3)_4][Pd(C_2O_4)_2]$  is  $[Pd(NH_3)_4][Pt(C_2O_4)_2]$

Ans: (a)

36. Identify the incorrect statement with respect to ethane - 1,2 - diamine ligand.

- (a) It is a symmetrical neutral ligand
- (b) It is a bidentate ligand
- (c) It is a chelating ligand
- (d) It is a weak field ligand

Sol: It is a strong field ligand

Ans: (d)

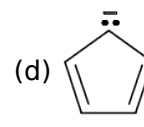
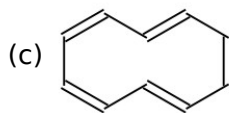
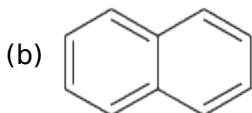
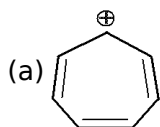
37. In the equation  $\lambda_m = \lambda_m^0 - A\sqrt{C}$ , the value of A will be same for:

- (a) NaCl and CaCl<sub>2</sub>
- (b) CaCl<sub>2</sub> and MgSO<sub>4</sub>
- (c) NaCl and KCl
- (d) KCl and MgSO<sub>4</sub>

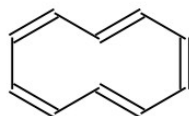
Sol: NaCl and KCl

Ans: (c)

38. Which of the following is not aromatic?



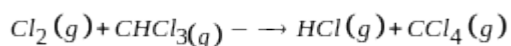
Sol:



Is non aromatic due to steric repulsion of internal hydrogen atoms

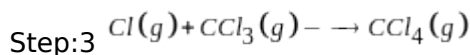
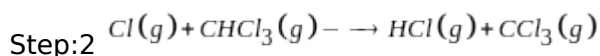
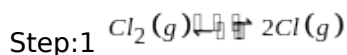
Ans: (c)

39. Consider this gas phase reaction



The reaction is found experimentally to follow this rate law

$$r = k[\text{CHCl}_3][\text{Cl}_2]^{1/2}$$



Based on above information, what conclusions can be drawn about this proposed mechanism?

- (a) Step-1 is rate determining step                      (b) Step - 3 is the rate determining step  
 (c) Step - 2 is the rate determining step                      (d) The rate determining step cannot be identified

Sol: step - 2 must be RDS because it contains  $\text{CHCl}_3(g)$  term which include in rate law.

Ans: (c)

40. In  $\text{CH}_4(g)$  molecule

- (a) All C - H bonds have same bond dissociation enthalpy  
 (b) Two of the C - H bonds have same bond dissociation energies  
 (c) No two bonds have same bond dissociation energies  
 (d) Three of the C - H bonds have same value of bond dissociation energy

Sol: In polyatomic molecule the value of bond dissociation energies of similar bonds are not equal.

Ans: (c)

41. Statement 1:  $\text{Na}^+$  and  $\text{Al}^{3+}$  are isoelectric but the ionic radius of  $\text{Al}^{3+}$  is less than that of  $\text{Na}^+$

Statement 2: The magnitude of effective nuclear charge of the outershell electrons in  $\text{Al}^{3+}$  is greater than that in  $\text{Na}^+$ .

Which of the following is correct for these is statements.

- (a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for Statement - 1  
 (b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

Sol: Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for Statement - 1

Ans: (a)

42. When a ideal binary solution is in equilibrium with its vapour, molar ratio of the two components in the solution and in the vapour phase is:

(a) Same

(b) Different

(c) May or may not be same depending upon volatile nature of the two components

(d) None of the above

Sol: Volatile nature  $\uparrow$ , vapour pressure increases, fraction in vapour phase increases.

Ans: (c)

43. The increasing order of atomic radii of the following group 13 elements is

(a)  $Al < Ga < In < Tl$  (b)  $Ga < Al < In < Tl$  (c)  $Al < In < Ga < Tl$  (d)  $Al < Ga < Tl < In$

Sol:

$Ga < Al < In < Tl$

135 pm    143 pm    167 pm    170 pm

Due to less screening effect of  $d$  orbital at radius of  $Ga$  is less than that of  $Al$

Ans: (b)

44. According to molecular orbital theory, which of the following will not be a viable molecule?

(a)  $H_2^{2-}$  (b)  $He_2^{2+}$  (c)  $He_2^+$  (d)  $H_2^-$

Sol:  $H_2^{2-}$  does not exist due to zero bond order

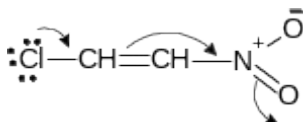
$$B.O. = \frac{2 - 2}{2} = 0$$

Ans: (a)

45. Which of the following has the shortest  $C - Cl$  bond?

(a)  $Cl - CH = CH - NO_2$  (b)  $Cl - CH = CH - CH_3$  (c)  $Cl - CH = CH - OCH_3$  (d)  $Cl - CH = CH_2$

Sol: Due to -R effect of  $-NO_2$  C-Cl bond has double bond character.

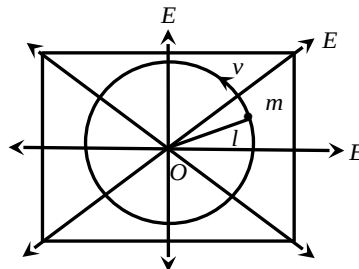


Ans: (a)

**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. A bob of mass  $m$  is tied with a thread and is made to move in a circular path on a horizontal frictionless table about point  $O$  as shown in the figure. A hypothetical electric field exists in the radial direction along the surface of the table. In this condition, the bob is uncharged and the tension in the thread is  $T$ . If now the bob is given some charge, then



- (a) Tension in thread must increase
- (b) Tension in thread may increase or decrease
- (c) Tension in thread will remain unchanged
- (d) Tension in thread must decrease

Sol: Tension may increase or decrease depending on the nature of charge given to sphere.

If charge is positive, 
$$T - qE = \frac{mv^2}{R} \Rightarrow T = qE + \frac{mv^2}{R}$$

Ans: (b)

47. The wavelength corresponding to the maximum energy, released during an atomic explosion was  $2.93 \times 10^{-10}$  m. Given that the Wien's constant is  $b = 2.93 \times 10^{-3}$  m-K, then the maximum temperature attained must be of the order of

- (a)  $10^{-7}$  K
- (b)  $10^7$  K
- (c)  $10^{-3}$  K
- (d)  $5.86 \times 10^7$  K

Sol:  $\lambda_m T = b$ ; 
$$T = \frac{b}{\lambda_m} = \frac{2.93 \times 10^{-3}}{2.93 \times 10^{-10}} \therefore T = 10^7 \text{ K}$$

Ans: (b)

48. After a perfectly inelastic collision between two identical particles which were moving with the same speed in different directions, the speed of the final particle becomes half the initial speed. The angle between the velocities of the two particles before collision is

- (a)  $60^\circ$
- (b)  $45^\circ$
- (c)  $120^\circ$
- (d)  $30^\circ$

Sol: In perfectly inelastic collision between two particles, linear momentum is conserved

Let  $\theta$  be the angle between the velocities of the two particles before collision, then

$$P^2 = P_1^2 + P_2^2 + 2P_1P_2 \cos \theta \quad \text{Or} \quad \left(2m \frac{v}{2}\right)^2 = (mv)^2 + (mv)^2 + 2(mv)(mv) \cos \theta$$

$$\text{Or } 1 = 1 + 1 + 2 \cos \theta \Rightarrow \cos \theta = -\frac{1}{2}$$

$$\therefore \theta = 120^\circ$$

Ans: (c)

49. A convex lens is immersed in a liquid whose refractive index is equal to the refractive index of the material of the lens. Then its focal length will

- (a) decrease                      (b) become zero                      (c) become infinite                      (d) remain the same

Sol: Given  ${}^a\mu_g = {}^a\mu_l$

The focal length  $f$  of convex lens in liquid is given by

$$\frac{1}{f} = \left( \frac{{}^a\mu_g}{{}^a\mu_l} - 1 \right) \left( \frac{1}{R_1} - \frac{1}{R_2} \right) = (1 - 1) \left( \frac{1}{R_1} - \frac{1}{R_2} \right)$$

$$\frac{1}{f} = 0 \quad \text{or} \quad f = \infty$$

Ans: (c)

50. Two bodies of masses  $10 \text{ kg}$  and  $100 \text{ kg}$  are separated by a distance of  $2 \text{ m}$ . The gravitational potential at the mid-point of the line joining the two bodies is:

- (a)  $-7.3 \times 10^{-7} \text{ J/kg}$                       (b)  $-7.3 \times 10^{-8} \text{ J/kg}$                       (c)  $-7.3 \times 10^{-9} \text{ J/kg}$                       (d)  $-7.3 \times 10^{-6} \text{ J/kg}$

Sol: As we know gravitational potential  $V = \frac{-GM}{R}$

$$\text{Gravitational potential at mid point} = \frac{-G \times 10}{1} + \frac{-G \times 100}{1} = -110G = -110 \times 6.67 \times 10^{-11} = -7.3 \times 10^{-9} \text{ Jkg}^{-1}$$

Ans: (c)

51. A block of mass  $2 \text{ kg}$  is attached to a spring of spring constant  $50 \text{ N/m}$ . The block is pulled to the position  $x = 5 \text{ cm}$  from its equilibrium position (at  $x = 0$ ) on a horizontal frictionless surface and released at  $t = 0$  from rest. The expression for its displacement at any time  $t$  is

- (a)  $5 \sin \left( 5t + \frac{\pi}{2} \right)$                       (b)  $\sin \left( 5t + \frac{\pi}{2} \right)$                       (c)  $5 \sin \left( 5t + \frac{3\pi}{2} \right)$                       (d)  $5 \sin \left( t + \frac{\pi}{2} \right)$

Sol: Given:  $k = 50 \text{ N/m}$ ,  $m = 2 \text{ kg}$

$$\therefore \omega = \sqrt{\frac{k}{m}} = \sqrt{\frac{50}{2}} = \sqrt{25} = 5 \text{ rad/s}$$

Let equation of motion be  $y(t) = A \sin(\omega t + \phi)$

But at  $t = 0$ ,  $y(t) = A$

$$\therefore y(0) = A = A \sin(\phi) \Rightarrow \sin \phi = 1$$

$$\Rightarrow \phi = \frac{\pi}{2}$$

$$\therefore y(t) = A \sin\left(\omega t + \frac{\pi}{2}\right) = A \cos \omega t$$

Putting  $A = 5 \text{ cm}$ ,  $\omega = 5 \text{ rad/s}$

$$y(t) = 5 \sin\left(5t + \frac{\pi}{2}\right)$$

Ans: (a)

52. The wavelength of Lyman series of hydrogen atom appears in:

- (a) visible region      (b) far infrared region      (c) ultraviolet region      (d) infrared region

Sol:

$$\frac{1}{\lambda} = R \left( \frac{1}{(1)^2} - \frac{1}{n^2} \right) \quad n = 2, 3, 4, \dots$$

$$\left( \frac{1}{\lambda_L} \right)_{\max} = R \left( \frac{1}{(1)^2} - \frac{1}{(2)^2} \right) \left( Q \frac{1}{R}; 912 \text{ \AA} \right)$$

$$(\lambda_L)_{\max} = \frac{4}{3} \frac{L}{R}$$

$$(\lambda_L)_{\max} = \frac{4}{3} \times 912 \text{ \AA} = \frac{0}{3} = 4 \times 304 = 1216 \text{ \AA}$$

$$\left( \frac{1}{\lambda_L} \right)_{\min} = R \left( \frac{1}{(1)^2} - \frac{1}{(\infty)^2} \right)$$

$$(\lambda_L)_{\min} = \frac{1}{R}; 912 \text{ \AA}$$

Range of  $\lambda$  is  $912 \text{ \AA}$  to  $1216 \text{ \AA}$  which lies in U.V. region.

Ans: (c)

53. If  $R_1$  and  $R_2$  are the resistances of the filaments of 200 W and 100 W electric bulbs operated

at 220 V, then  $\left(\frac{R_1}{R_2}\right)$  is:

- (a) 2 (b) 0.5 (c) 4 (d) 0.25

Sol:  $P = \frac{V^2}{R} \therefore \frac{R_1}{R_2} = \frac{P_2}{P_1}$

$\frac{R_1}{R_2} = \frac{100}{200} = 0.5$

Ans: (b)

54. An engine is attached to a wagon through a shock absorber of length 1.5 m. The entire system with a total mass of 50000 kg is moving with a speed of 36 kmh<sup>-1</sup> when the brakes are applied to bring it to rest. In this process, the spring of the shock absorber gets compressed by 1.0 m. If 90% of the energy of the wagon is lost due to friction, the spring constant is

- (a)  $5.0 \times 10^5$  N/m (b)  $4.0 \times 10^5$  N/m (c)  $1.0 \times 10^5$  N/m (d)  $2.0 \times 10^5$  N/m

Sol:  $m = 50000$  kg,  $v = 36$  km/hr = 10 m/s and  $x = 1.0$  m

$KE = \frac{1}{2}mv^2 = \frac{1}{2} \times 50000 \times 10^2 = 2.5 \times 10^6$  J

Since 90% KE of system is lost due to friction, therefore kinetic energy transferred to

Shock absorber = 10% of  $KE_{total} = \frac{10}{100} \times 2.5 \times 10^6 = 2.5 \times 10^5$  J

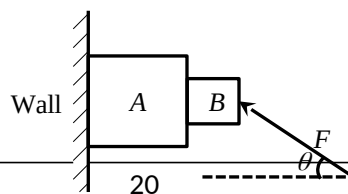
This KE is converted into spring energy

$2.5 \times 10^5 = \frac{1}{2}kx^2 \quad 2.5 \times 10^5 = \frac{1}{2} \times k \times 1^2$

$\therefore k = 5.0 \times 10^5$  N/m

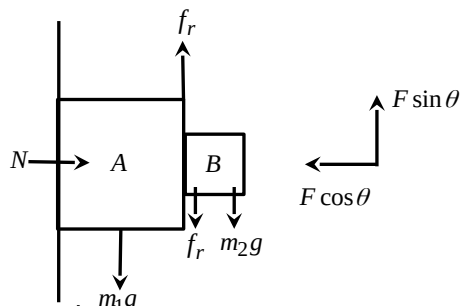
Ans: (a)

55. Consider the situation shown in the figure. The wall is smooth but the surfaces of blocks A and B in contact are rough. The friction on A due to B in equilibrium



- (a) Is upward
- (b) Is downward
- (c) Is zero
- (d) The system cannot remain in equilibrium for any value of  $F$ .

Sol:



Block  $A$  tends to move down due to its own weight. So, for its equilibrium, friction acting on it due to block  $B$  points in upward direction.

Ans: (a)

56. A coil having  $200$  turns has a surface area of  $0.15 \text{ m}^2$ . A magnetic field applied perpendicular to the coil changes from  $0.2 \text{ T}$  to  $0.6 \text{ T}$  in  $0.4 \text{ s}$ , then the average induced emf [in V] is

- (a)  $45 \text{ V}$
- (b)  $30 \text{ V}$
- (c)  $15 \text{ V}$
- (d)  $60 \text{ V}$

Sol:  $\phi = n \times A \times B$

$$\begin{aligned} \Rightarrow \epsilon &= \frac{\Delta \phi}{\Delta t} = nA \frac{\Delta B}{\Delta t} \\ &= 200 \times 0.15 \times \frac{(0.6 - 0.2)}{0.4} \end{aligned}$$

$$\therefore \epsilon = 30 \text{ V}$$

Ans: (b)

57. One-litre of oxygen at a pressure of  $1 \text{ atm}$  and two-litre of nitrogen at a pressure of  $0.5 \text{ atm}$  are introduced into a vessel of volume one-litre. If there is no change in temperature, the final pressure of the mixture of the gases [in atm] is

- (a)  $1.5 \text{ atm}$
- (b)  $2.5 \text{ atm}$
- (c)  $2 \text{ atm}$
- (d)  $4 \text{ atm}$

Sol:  $PV = nRT$ , for oxygen,  $P = 1 \text{ atm}$ ,  $V = 1 \text{ L}$ ,  $n = n_{O_2}$

$$\therefore 1 \times 1 = n_{O_2} RT \Rightarrow n_{O_2} = \frac{1}{RT}$$

For nitrogen,  $P = 0.5 \text{ atm}$ ,  $V = 2 \text{ L}$ ,  $n = n_{N_2}$

$$\therefore 0.5 \times 2 = n_{N_2} RT$$

$$\Rightarrow n_{N_2} = \frac{1}{RT}$$

For mixture of gas,  $P_{\text{mix}} V_{\text{mix}} = n_{\text{mix}} RT$

Here  $n_{\text{mix}} = n_{O_2} + n_{N_2}$

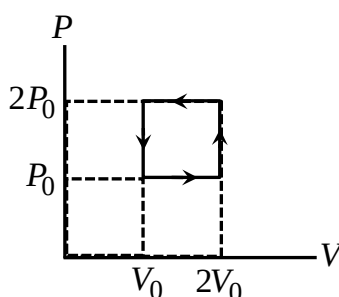
$$\therefore \frac{P_{\text{mix}} V_{\text{mix}}}{RT} = \frac{1}{RT} + \frac{1}{RT}$$

$$\Rightarrow P_{\text{mix}} V_{\text{mix}} = 2$$

$$\therefore P_{\text{mix}} = 2$$

Ans: (c)

58. In the figure shown below, an ideal gas is carried around the cyclic process. How much work is done by the gas in one cycle if  $P_0 = 8 \text{ atm}$  and  $V_0 = 7.00 \text{ litre}$ ?



- (a) 5656 J                      (b) - 5656 J                      (c) 10600 J                      (d) 11300 J

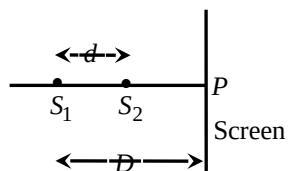
Sol: For anticlockwise  $P$ - $V$  loop,  $W = -ve$ .

$$\text{Area enclosed by the loop} = W = P_0 V_0 = -8 \times (10^5 \times 1.01) \times 7 \times 10^{-3}$$

$$\therefore W = -5656 \text{ J}$$

Ans: (b)

59. Two coherent point sources  $S_1$  and  $S_2$  are separated by a small distance  $d$  as shown in the figure. The fringes obtained on the screen will be



- (a) semi-circles                      (b) concentric circles                      (c) points                      (d) straight lines

Sol: Path difference on a circle having centre at  $P$  is same. So, the fringes obtained on the screen in the given condition will be concentric circles.

Ans: (b)

60. A vehicle of mass  $m$  is moving on a rough horizontal road with momentum  $P$ . If the coefficient of friction between the tyres and the road is  $\mu$ , then the stopping distance is

- (a)  $\frac{p}{2\mu mg}$       (b)  $\frac{p^2}{2\mu mg}$       (c)  $\frac{p}{2\mu m^2 g}$       (d)  $\frac{p^2}{2\mu m^2 g}$

Sol: From work energy theorem

$$\frac{p^2}{2m} = \mu mgs \Rightarrow s = \frac{p^2}{2\mu m^2 g}$$

Ans: (d)

61. The dimensional formula for the magnetic field is

- (a)  $[MT^{-2}A^{-1}]$       (b)  $[ML^2T^{-1}A^{-2}]$       (c)  $[MT^{-2}A^{-2}]$       (d)  $[MT^{-1}A^{-2}]$

Sol: Magnetic field =  $\frac{\text{Force}}{\text{Charge} \times \text{velocity}}$

$$[B] = \frac{[MLT^{-2}]}{[AT][LT^{-1}]} = [MA^{-1}T^{-2}]$$

Ans: (a)

62. A body is dropped from a certain height above the surface of the earth. When it loses  $U$  amount of its potential energy, it acquires a velocity  $v$ . The mass of the body is

- (a)  $\frac{2U}{v^2}$       (b)  $\frac{2v}{U^2}$       (c)  $\frac{2v}{U}$       (d)  $\frac{U^2}{2v}$

Sol: Using the conservation of mechanical energy

$$K_i + P_i = K_f + P_f; \quad 0 + P = \frac{1}{2}mv^2 + (P - U); \quad \frac{1}{2}mv^2 = U$$

$$m = \frac{2U}{v^2}$$

Ans: (a)

63. A boy and a man carry a uniform rod of length  $L$ , horizontally in such a way that the boy gets  $\frac{1}{4}$  of the load. If the boy is at one end of the rod, the distance of the man from the other end is?

- (a)  $\frac{L}{3}$                       (b)  $\frac{L}{4}$                       (c)  $\frac{2L}{3}$                       (d)  $\frac{3L}{4}$

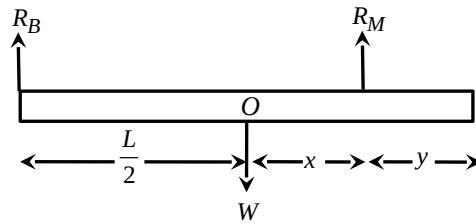
Sol: Weight of the rod =  $W$

Reaction of the boy  $R_B = \frac{W}{4}$

Reaction of the man  $R_M = \frac{3W}{4}$

As the rod is in rotational equilibrium

$$\therefore \Sigma \tau_o = 0 \Rightarrow \left( \frac{W}{4} \times \frac{L}{2} \right) - \left( \frac{3W}{4} \times x \right) = 0 \Rightarrow x = \frac{L}{6}$$



$$\therefore \text{Distance of the man from the other end } y = \frac{L}{2} - x = \frac{L}{2} - \frac{L}{6}; \therefore y = \frac{L}{3}$$

Ans: (a)

64. The ratio of frequencies of fundamental harmonic produced by an open pipe to that of closed pipe having the same length is

- (a) 2:1                      (b) 1:3                      (c) 3:1                      (d) 1:2

Sol: The fundamental frequency of an open pipe,  $n_{oop}$  is given by  $V/(2L)$ , where  $V$  is the speed of sound and  $L$  is the length of the pipe. For a closed pipe of the same length, the fundamental frequency,  $n_{cop}$  is  $V/(4L)$  since only half as many wavelengths fit into the same length due to the closed end. Therefore, the ratio of frequencies of an open pipe to a closed pipe is:

$$\frac{n_{oop}}{n_{cop}} = \frac{V/(2L)}{V/(4L)} = \frac{4L}{2L} = 2:1$$

This shows that the fundamental frequency of an open pipe is twice that of a closed pipe of the same length.

Ans: (a)

65. An intense stream of water of cross section area  $A$  strikes a wall at an angle  $\theta$  with normal to the wall and rebounds elastically. If the density of water is  $\rho$  and its velocity is  $v$ , then the force exerted on the wall will be

- (a)  $2Av^2\rho$                       (b)  $Av^2\rho$                       (c)  $2Av^2\rho\sin\theta$                       (d)  $2Av^2\rho\cos\theta$

Sol: Linear momentum of water striking per second to the wall,  $p_i = mv = Av\rho v = Av^2\rho$

Linear momentum of reflected water per second

$$p_f = Av^2\rho$$

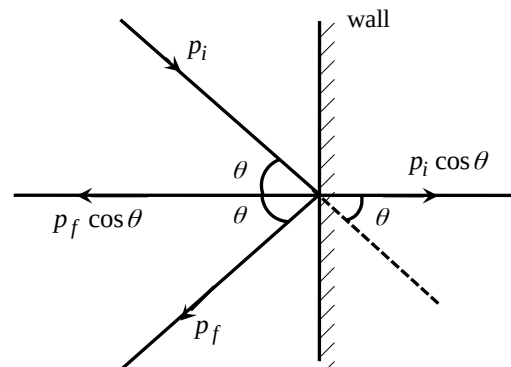
Since wall is smooth, there is no change in momentum of water along the wall.

$\therefore$  Change in momentum of water per second perpendicular to wall

$$= p_i \cos\theta + p_f \cos\theta = 2Av^2\rho\cos\theta$$

$\therefore$  Force =  $2Av^2\rho\cos\theta$

Ans: (d)



66. An object is approaching a thin convex lens of focal length  $0.3\text{ m}$  with a speed of  $0.01\text{ m/s}$ . The magnitude of the rate of change of lateral magnification of image when the object is at distance of  $0.4\text{ m}$  from the lens is

- (a)  $0.3$                       (b)  $0.6$                       (c)  $-0.6$                       (d)  $-0.3$

Sol:  $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$  Differentiating w.r.t  $t$

$$\frac{-1}{v^2} \frac{dv}{dt} + \frac{1}{u^2} \frac{du}{dt} = 0 \Rightarrow \frac{dv}{dt} = \frac{v^2}{u^2} \frac{du}{dt}$$

Given  $u = -0.4\text{ m}$ ,  $f = 0.3\text{ m}$

$$\frac{1}{v} + \frac{1}{0.4} = \frac{1}{0.3} \text{ or } v = 1.2\text{ m} \quad \therefore \frac{dv}{dt} = \frac{1.2^2}{0.4^2} \times 0.01 = 0.09\text{ m/s}$$

Lateral magnification,  $m = \frac{v}{u} \therefore \frac{dm}{dt} = \frac{u \frac{dv}{dt} - v \frac{du}{dt}}{u^2} = \frac{(-0.4)(0.09) - (1.2)(0.01)}{(0.4)^2} = -0.3$

Ans: (d)

67. The instantaneous current and voltage of an AC circuit are given by  $i = 10\sin(314t)$  A and  $V = 100\sin(314t)$  V. What is the power dissipation in the circuit?

- (a) 100 W                      (b) 500 W                      (c) 300 W                      (d) 200 W

Sol:  $I = 10\sin(314t)$  &  $V = 100\sin(314t)$

Comparing with  $I = I_0 \sin \omega t$  and  $V = V_0 \sin \omega t$

$$\therefore I_0 = 10 \text{ A and } V_0 = 100 \text{ V} \Rightarrow I_{\text{rms}} = \frac{10}{\sqrt{2}} \text{ A, } V_{\text{rms}} = \frac{100}{\sqrt{2}} \text{ V}$$

Phase difference  $\phi = 0^\circ$

$$\therefore P_{\text{av}} = V_{\text{rms}} \times I_{\text{rms}} \times \cos \phi = \frac{10}{\sqrt{2}} \times \frac{100}{\sqrt{2}} \times \cos 0 = 500 \text{ W}$$

Ans: (b)

68. A fully charged capacitor has a capacitance  $C$ . It is discharged through a small coil of resistance wire embedded in a thermally insulated block of specific heat capacity  $s$  and mass  $m$ . If the temperature of the block is raised by  $\Delta T$ , the initial potential difference  $V$  across the capacitance is

- (a)  $\sqrt{\frac{2mC\Delta T}{s}}$                       (b)  $\frac{mC\Delta T}{s}$                       (c)  $\frac{ms\Delta T}{C}$                       (d)  $\sqrt{\frac{2ms\Delta T}{C}}$

Sol:  $E = \frac{1}{2} CV^2$                       ....(i)

The energy stored in capacitor is lost in the form of heat energy

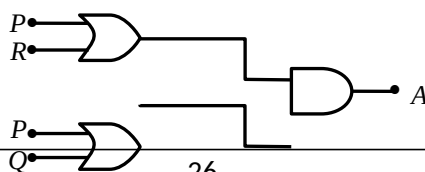
$$E = ms\Delta T \quad \text{....(ii)}$$

From equations (i) and (ii),

$$ms\Delta T = \frac{1}{2} CV^2 \Rightarrow V = \sqrt{\frac{2ms\Delta T}{C}}$$

Ans: (d)

69. The diagram of a logic circuit is given below. The output  $A$  of the circuit is represented by



- (a)  $P + R \cdot Q$       (b)  $P \cdot (R \cdot Q)$       (c)  $P \cdot (R + Q)$       (d)  $P + (R + Q)$

Sol: Output of upper OR gate  $= P + R$

Output of lower OR gate  $= P + Q$

$$\therefore \text{Net output } A = (P + R) \cdot (P + Q) = P \cdot P + P \cdot Q + R \cdot P + R \cdot Q = P \cdot (1 + Q) + R \cdot P + R \cdot Q$$

$$\therefore 1 + Q = 1 \ \& \ P \cdot 1 = P$$

$$\therefore A = P + RP + R \cdot Q = P(1 + R) + R \cdot Q \Rightarrow A = P + R \cdot Q$$

Ans: (a)

70. Two particles are projected simultaneously in the same vertical plane, from the same point, but with different speeds and at different angles with horizontal. The path followed by one, as seen by the other is

- (a) part of a circle  
 (b) a parabola  
 (c) a hyperbola  
 (d) a straight line making a constant angle with the horizontal.

Sol: Let  $u_1$  and  $u_2$  be the initial velocities of two particles and  $\theta_1$  and  $\theta_2$  be their angles of projection with the horizontal

The velocities of the two particles after time 't' are

$$v_1 = (u_1 \cos \theta_1) \hat{i} + (u_1 \sin \theta_1 - gt) \hat{j} \quad \text{and} \quad v_2 = (u_2 \cos \theta_2) \hat{i} + (u_2 \sin \theta_2 - gt) \hat{j}$$

Their relative velocity is

$$v_{12} = v_1 - v_2 = (u_1 \cos \theta_1 - u_2 \cos \theta_2) \hat{i} + (u_1 \sin \theta_1 - u_2 \sin \theta_2) \hat{j} \quad \text{which is a constant}$$

So the path followed by one as seen by the other is a straight line making a constant angle with the horizontal.

Ans: (d)

71. A bimetallic is made of two strips A and B having coefficients of linear expansion  $\alpha_A$  and  $\alpha_B$ . If  $\alpha_A < \alpha_B$ , then on heating, the strip will

- (a) Bend with A on outer side      (b) Bend with B on outer side  
 (c) Not bend at all      (d) Nothing can be said

Sol: As  $\alpha_B > \alpha_A$ , therefore strip B will expand more and hence will appear on outer side.

Ans: (b)

72. A wire of natural length  $l$ , Young's modulus  $Y$  and area of cross-section  $A$  is extended by  $x$ . Then the energy stored in the wire is given by

- (a)  $\frac{1}{2} \frac{YA}{l} x^2$       (b)  $\frac{1}{3} \frac{YA}{l} x^2$       (c)  $\frac{1}{2} \frac{Yl}{A} x^2$       (d)  $\frac{1}{2} \frac{A}{Yl} x^2$

Sol: Energy stored in the wire

$$U = \frac{1}{2} Y \times (\text{strain})^2 \times \text{volume} \quad \text{Or} \quad U = \frac{1}{2} Y \times \left(\frac{x}{l}\right)^2 \times Al = \frac{1}{2} \frac{Yx^2}{l} \times A = \frac{1}{2} \frac{YA}{l} x^2$$

Ans: (a)

73. A copper disc of the radius  $0.1 \text{ m}$  is rotated about its centre with  $20$  revolutions per second in a uniform magnetic field of  $0.1 \text{ T}$  with its plane perpendicular to the field. The emf induced across the radius of the disc is:

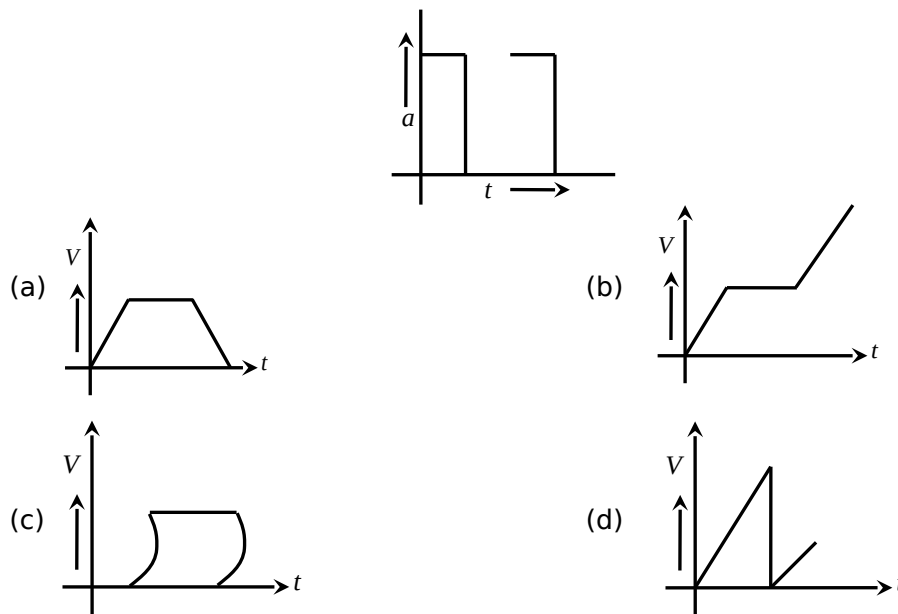
- (a)  $\frac{\pi}{20}$  volt      (b)  $\frac{\pi}{10}$  volt      (c)  $20\pi$  millivolt      (d)  $100\pi$  millivolt

$$\text{Sol: } \varepsilon = \frac{B\omega R^2}{2} = \frac{0.1 \times 2\pi \times 20 \times (0.1)^2}{2}$$

$$\therefore \varepsilon = 20\pi \times 10^{-3} \text{ V}$$

Ans: (c)

74. Figure shows the acceleration-time graph of a particle. Which of the following represents the corresponding velocity-time graph?



Sol: Initially acceleration is constant. Therefore there is uniform increase in velocity. So, the  $V-t$  graph is a straight line sloping upward to the right. When acceleration becomes zero. Velocity is constant so  $V-t$  graph is a straight line parallel to the time axis.

Ans: (b)

75. A single slit of width  $b$  is illuminated by a coherent monochromatic light of wavelength  $\lambda$ . If the second and fourth minima in the diffraction pattern at a distance  $1\text{ cm}$  from the slit are at  $3\text{ cm}$  and  $6\text{ cm}$  respectively from the central maximum. What is the width of the central maximum? (i.e. distance between first minimum on either side of the central maximum)

- (a) 4.5 cm                      (b) 1.5 cm                      (c) 6.0 cm                      (d) 3.0 cm

Sol: For secondary minima,  $d \sin \theta = n\lambda$

$$\sin \theta = \frac{n\lambda}{d}$$

For second minima,  $n=2$

$$\sin \theta_1 = \frac{2\lambda}{d}, \quad \tan \theta_1 = \frac{x_1}{D} \quad \text{and} \quad \sin \theta_1 \approx \tan \theta_1$$

For fourth minima,  $n=4$

$$\sin \theta_2 = \frac{4\lambda}{d} = \frac{x_2}{D}$$

$$x_2 - x_1 = \frac{4\lambda D}{d} - \frac{2\lambda D}{d} = \frac{2\lambda D}{d} = 6 - 3 = 3\text{ cm}$$

$$\text{Width of central max} = \frac{2\lambda D}{d} = 3\text{ cm}$$

Ans: (d)

76. An emf is generated by an ac generator having 100 turn coil, of loop area  $1\text{ m}^2$ . The coil rotates at a speed of one revolution per second and placed in a uniform magnetic field of  $0.05\text{ T}$  perpendicular to the axis of rotation of the coil. The maximum value of emf is :-

- (a) 3.14V                      (b) 31.4V                      (c) 62.8V                      (d) 6.28V

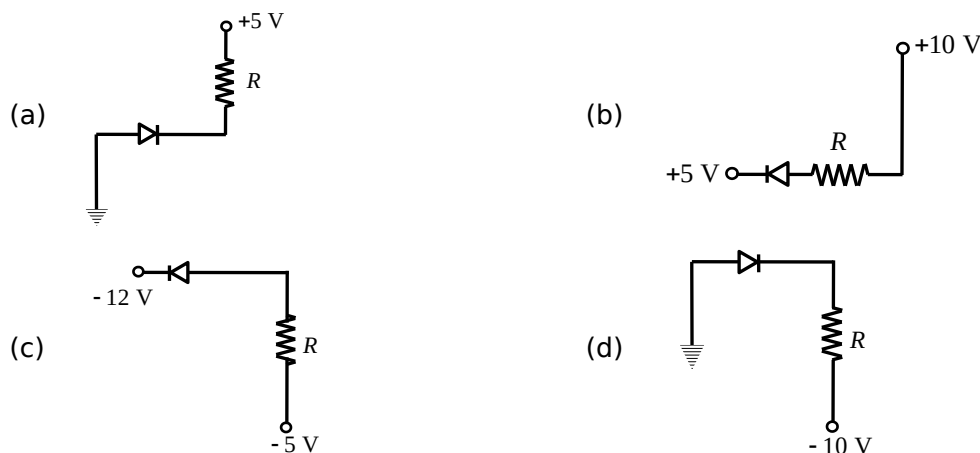
Sol:  $\omega = 2\pi \frac{\text{rad}}{\text{sec}}$

$$E_{\text{max}} = NBA\omega$$

$$= 100 \times 0.05 \times 1 \times 2\pi = 10 \times \pi = 31.4\text{ V}$$

Ans: (b)

77. In the following, which one of the diodes is reverse biased?



Sol: In a diode, when potential of 'n' is at high potential and potential of 'p' is at low potential, then it is called reverse biased

Ans: (a)

78. How many times smaller is the spacing between the energy levels with  $n = 3$  and  $n = 4$  than the spacing between the energy levels with  $n = 8$  and  $n = 9$  for a hydrogen like atom or ion?

- (a) 0.71                                      (b) 0.41                                      (c) 2.43  
(d) 14.82

Sol: Radius of orbit  $r \propto \frac{n^2}{z} \propto n^2$  ( $z = 1$  for hydrogen) ;  $\frac{r_4 - r_3}{r_9 - r_8} = \frac{4^2 - 3^2}{9^2 - 8^2} = \frac{7}{17} = 0.41$

Ans: (b)

79. A container of volume  $200\text{cm}^3$  contains  $0.2$  mole of hydrogen gas and  $0.3$  mole of argon gas.

The pressure of the system at temperature  $200\text{K}$  ( $R = 8.3\text{JK}^{-1}\text{mol}^{-1}$ ) will be:-

- (a)  $6.15 \times 10^5 \text{Pa}$                       (b)  $6.15 \times 10^4 \text{Pa}$                       (c)  $4.15 \times 10^5 \text{Pa}$                       (d)  $4.15 \times 10^6 \text{Pa}$

Sol:

$$P_{\text{mix}} = \frac{(\mu_1 + \mu_2)RT_{\text{mix}}}{V_{\text{mix}}}$$

$$= \frac{(0.2 + 0.3) \times 8.3 \times 200}{200 \times 10^{-6}}$$

$$= \frac{0.5 \times 8.3 \times 200}{200 \times 10^{-6}}$$

$$P_{\text{mix}} = 4.15 \times 10^6 \text{Pa}$$

Ans: (c)

80. A given quantity of an ideal gas is at a pressure  $P$  and absolute temperature  $T$ . The isothermal bulk modulus of the gas is

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

$$B = - \left( \frac{dP}{\frac{dV}{V}} \right)$$

Sol:

In isothermal process,  $PV = \text{constant}$

$$\Rightarrow P + \frac{VdP}{dV} = 0 \Rightarrow \frac{dV}{V} = \frac{-dP}{P} \Rightarrow B_{\text{isoth}} = \frac{-dP}{\left(\frac{dV}{V}\right)} = \frac{-dP}{\left(\frac{-dP}{P}\right)} = P$$

Ans: (b)

81. A transformer of efficiency 90% has turns ratio 10:1. If the voltage across the primary coil is 220 V and current in the primary is 0.5 A, then the current in secondary coil is

- (a) 5.5 A                      (b) 5 A                      (c) 0.045 A                      (d) 4.5 A

Sol: Given  $\frac{N_S}{N_P} = \frac{10}{1}$ ,  $V_P = 220 \text{ V}$ ,  $I_P = 0.5 \text{ A}$

$$\frac{V_P}{V_S} = \frac{N_P}{N_S}$$

$$\eta = \frac{\text{Output power}}{\text{Input power}} = \frac{I_S V_S}{I_P V_P}$$

$$\frac{90}{100} = \frac{I_S}{0.5} \times 10, \quad I_S = 0.045 \text{ A}$$

Ans: (c)

82. When monochromatic radiation of intensity  $I$  falls on a metal surface, the number of photoelectrons and their maximum kinetic energy are  $N$  and  $T$  respectively. If the intensity of radiation is  $2I$ , the number of emitted electrons and their maximum kinetic energy are respectively

- (a)  $N$  and  $2T$                       (b)  $2N$  and  $T$                       (c)  $2N$  and  $2T$                       (d)  $N$  and  $T$

Sol: The number of photoelectrons ejected is directly proportional to the intensity of incident light. Maximum kinetic energy is independent of intensity of incident light but depends upon the frequency of light.

Ans: (b)

83. When the angle of incidence on a material is  $60^\circ$ , the reflected light is completely polarised.

The velocity of the refracted ray inside the material is (in  $\text{ms}^{-1}$ )

- (a)  $3 \times 10^8$       (b)  $\left(\frac{3}{\sqrt{2}} \times 10^8\right)$       (c)  $\sqrt{3} \times 10^8$       (d)  $0.5 \times 10^8$

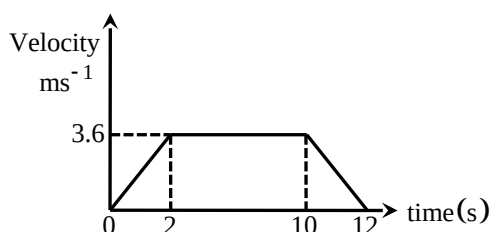
Sol: Refractive index,  $\mu = \tan i_p = \tan 60^\circ = \sqrt{3}$

$$v = \frac{c}{\mu} = \frac{3 \times 10^8}{\sqrt{3}} = \sqrt{3} \times 10^8 \text{ms}^{-1}$$

So, the velocity of refracted ray inside the material

Ans: (c)

84. An elevator is going upward and the variation in the velocity of the elevator is as given in the graph. What is the height to which the elevator takes the passengers?



- (a) 3.6 m      (b) 28.8m      (c) 36.0 m      (d) 32.4m

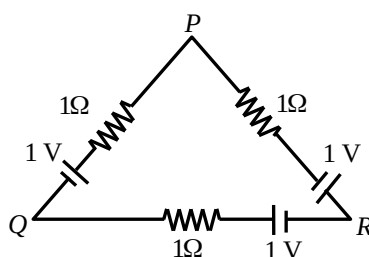
Sol: Area under the graph will give displacement (height).

$$\text{Height} = \left(\frac{1}{2} \times 4 \times 3.6\right) + (3.6 \times 8) = 36 \text{ m}$$

Ans: (c)

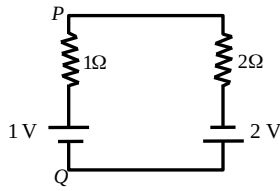
85. Three cells of emf  $1 \text{ V}$  each and internal resistance  $1 \Omega$  each are connected as shown.

Effective emf of combination between the points  $P$  and  $Q$  is



- (a) Zero      (b)  $1 \text{ V}$       (c)  $2 \text{ V}$   
 (d)  $\frac{2}{3} \text{ V}$

Sol: Two batteries of emf  $1V$  (in  $PR$  and  $QR$ ) are combined and two their resistances also combine is series



$$E_{\text{net}} = \frac{E_1 r_2 - E_2 r_1}{r_1 + r_2} = \frac{2 - 2}{2 + 1} = 0$$

Ans: (a)

86. Three particles start from the origin at the same time, one with velocity  $v_1$  along the  $x$ -axis, second along the negative  $y$ -axis with a velocity  $v_2$  and third particle moves along the line  $x = y$ . The velocity of third particle, so that three may always lie on the same line is:

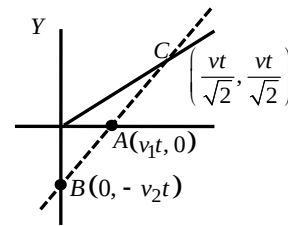
- (a)  $\frac{v_1 + v_2}{2}$       (b)  $\sqrt{v_1 + v_2}$       (c)  $\frac{v_1 v_2}{v_1 + v_2}$       (d)  $\frac{\sqrt{2} v_1 v_2}{v_2 - v_1}$

Sol: Let speed of third particle be  $v$ . At time  $t$ , positions of particles are shown.

Slope of line  $AC$  = slope of line  $BA$

$$\frac{\left(\frac{vt}{\sqrt{2}} - 0\right)}{\left(\frac{vt}{\sqrt{2}} - v_1 t\right)} = \frac{0 - (-v_2 t)}{(v_1 t - 0)}$$

$$v = \frac{\sqrt{2} v_1 v_2}{v_2 - v_1}$$



Ans: (d)

87. A laser beam is sent to the moon and reflected back to earth by a mirror placed on the moon by an astronaut. If the moon is at  $3,84,000 \text{ km}$  distance from earth, how long does it take the light to make the round trip?

- (a) 5 min      (b) 2.5 min      (c) 2.5 s      (d) 500 s

Sol: Distance of moon from Earth  $(s) = 384000 \text{ km} = 384000 \times 10^3 \text{ m}$

Speed of light  $(c) = 3 \times 10^8 \text{ m/s}$       Total time taken by laser beam to make the round trip

$$t = \frac{2s}{c} = \frac{2 \times 384000 \times 10^3}{3 \times 10^8} = 2.5 \text{ s}$$

Ans: (c)

88. The wheel of a toy car rotates about an axis on the rough surface. Its angular frequency slows down from 400 rps to 200 rps in 2 s. Then its magnitude of angular retardation in  $\text{rad s}^{-2}$  is
- (a)  $200\pi \text{ rad s}^{-2}$       (b)  $100\pi \text{ rad s}^{-2}$       (c)  $400\pi \text{ rad s}^{-2}$       (d)  $300\pi \text{ rad s}^{-2}$

Sol: Given  $\omega_1 = 2\pi \times (400) \text{ rad s}^{-1}$ ,  $\omega_2 = 2\pi \times (200) \text{ rad s}^{-1}$

$$\alpha = \frac{\omega_2 - \omega_1}{t} = 2\pi \frac{(200 - 400)}{2}$$

$$= -200\pi \text{ rad s}^{-2}; \quad |\alpha| = 200\pi \text{ rad s}^{-2}$$

Ans: (a)

89. The resultant of two forces acting at right angles to each other is  $5 \text{ N}$ . When the angle between them is  $120^\circ$ , the resultant is  $\sqrt{13} \text{ N}$ . Then the forces are respectively
- (a)  $\sqrt{12} \text{ N}, \sqrt{13} \text{ N}$       (b)  $\sqrt{20} \text{ N}, \sqrt{5} \text{ N}$       (c)  $3 \text{ N}, 4 \text{ N}$       (d)  $\sqrt{40} \text{ N}, \sqrt{15} \text{ N}$

Sol: Let  $A$  and  $B$  be the two forces as per question

$$\sqrt{A^2 + B^2} = 5$$

$$\text{Or } A^2 + B^2 = 25 \quad \dots(i)$$

$$\text{And } A^2 + B^2 + 2AB \cos 120^\circ = 13 \quad \text{Or } AB = 25 - 13 = 12$$

$$\text{Or } 2AB = 24 \quad \dots(ii)$$

Solving (i) and (ii), we get,

$$A = 3 \text{ N} \quad \text{and} \quad B = 4 \text{ N}$$

Ans: (c)

90. An electron having kinetic energy  $10 \text{ eV}$  is circulating in a circular path of radius  $0.1 \text{ m}$  in an external magnetic field of intensity  $10^{-4} \text{ T}$ . The speed of the electron will be
- (a)  $1.76 \times 10^6 \text{ ms}^{-1}$       (b)  $4.8 \times 10^6 \text{ ms}^{-1}$       (c)  $2.0 \times 10^7 \text{ ms}^{-1}$       (d)  $4.8 \times 10^7 \text{ ms}^{-1}$

Sol:  $\frac{mv^2}{r} = qvB$

$$v = \frac{rqB}{m} = \frac{0.1 \times 1.6 \times 10^{-19} \times 10^{-4}}{9.1 \times 10^{-31}}$$

$$\therefore v = 1.76 \times 10^6 \text{ ms}^{-1}$$

Ans: (a)

**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. What are flocs?

- (a) Masses of fungi with root of higher plants      (b) Association of fungi with algae  
(c) Masses of bacteria with fungi      (d) Masses of bacteria with

leguminous plants

Sol: Masses of bacteria with fungi

Ans:(c)

92. Viral infection is usually absent in

- (a) Phloem cells      (b) Xylem cells      (c) Pith cells      (d) Apical meristem

Sol: Apical meristem

Ans: (d)

93. In some seeds, remnants of nucellus are persistent. Example for such seed is

- (a) Wheat      (b) Maize      (c) Black pepper      (d) Barley

Sol: Black pepper

Ans: (c)

94. Based on characteristics, all living organism can be classified into different taxa, the process of classification is

- (a) Entomology (b) Zoology (c) Bacteriology  
(d) Taxonomy

Sol: Taxonomy

Ans: (d)

95. Which of the following is correct regarding glycolysis

- (a) It occurs in the cytoplasm of the cell  
(b) Hydrogen atoms are removed from  $NAD^+$  and transferred to PGAL.  
(c) ATP is consumed during the conversion of PEP to pyruvic acid.  
(d) Conversion of BPGA to PGA is not an energy yielding process.

Sol: It occurs in the cytoplasm of the cell

Ans: (a)

96. Leaf pigments are separated by

- (a) Crystallization (b) Gel electrophoresis  
(c) Blotting (d) Paper chromatography

Sol: Paper chromatography

Ans: (d)

97. Which of the following statement is correct?

- (a) Paramecium and Plasmodium belong to the same kingdom as that of Penicillium.  
(b) Lichen is a composite organism formed from the symbiotic association of an alga and a protozoan  
(c) Yeast used in making bread and beer is a fungus  
(d) Nostoc and Anabaena are examples of protists.

Sol: Yeast used in making bread and beer is a fungus

Ans: (c)

98. ABA plays an important role in

- (a) Dormancy of seeds (b) Root elongation (c) Shoot elongation (d) Increased cell division

Sol: Dormancy of seeds

Ans: (a)

99. During which stage of sewage treatment microbes are used?

- (a) Primary treatment (b) Secondary treatment  
(c) Tertiary treatment (d) All of these

Sol: Secondary treatment

Ans: (b)

100. The salient features of DNA are given, choose the incorrect statement

- (a) The back bone of DNA is constituted by Sugar-phosphate
- (b) The two chains have anti parallel polarity
- (c) The bases in two strands are paired through OH' bonds
- (d) Pitch of the helix is 3.4nm.

Sol: The bases in two strands are paired through OH' bonds

Ans: (c)

101. The main factor in increasing the population is

- (a) Only reproductive capacity
- (b) Early marriage only
- (c) Higher natality and lower mortality
- (d) Suitable and favourable

environment only

Sol: Higher natality and lower mortality

Ans: (c)

102. Who said 'all cells arise from pre-existing cells'?

- (a) Robert Hooke
- (b) Rudolf Virchow
- (c) Robert Brown
- (d) Antony van Leeuwenhoek

Sol: Rudolf Virchow

Ans: (b)

103. Which of the following is pollinated by water?

- (a) Viola
- (b) Yucca
- (c) Oxalis
- (d) Zostera

Sol: Zostera

Ans: (d)

104. Vertical distribution of different species occupying different levels is called as

- (a) fortification
- (b) stratification
- (c) remediation
- (d) composition

Sol: stratification

Ans: (b)

105. The stress hormone in plants is

- (a) Ethylene
- (b) ABA
- (c) IAA
- (d) NAA

Sol: ABA

Ans: (b)

106. The traditional drink made by fermenting sap from palms is

- (a) Wine
- (b) Beer
- (c) Toddy
- (d) Rum

Sol: Toddy

Ans: (c)

107. A gel which can be used to grow microbes can be obtained from

- (a) Gelidium                      (b) Gracillaria                      (c) Laminaria                      (d) Both (a) and (b)

Sol: Both (a) and (b)

Ans: (d)

108. The bundle sheath cells of  $C_4$  plants having Kranz anatomy possess

- (a) Thin walls, no intercellular spaces and few chloroplasts  
 (b) Thick walls, many intercellular spaces and few chloroplasts  
 (c) Thin walls, many intercellular spaces and no chloroplasts.  
 (d) Thick walls, no intercellular spaces and large number of chloroplasts

Sol: Thick walls, no intercellular spaces and large number of chloroplasts

Ans: (d)

109. Read the statements regarding wind pollination. Choose the correct option with correct statement

1. Pollination by wind is more common amongst abiotic pollinations.
2. Pollen grains must be sticky to get transported in the air.
3. Wind pollinated flowers often have feathery stigma.
4. Pollen grains are protected by mucilaginous covering.

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

Sol: Statements 1 and 3 only

Ans: (c)

110. The Ministry of Environment and Forest has initiated which plan to save major rivers of our country?

- (a) Ganga action plan                      (b) Yamuna action plan                      (c) Fermentation plan  
 (d) Both (a) and (b)

Sol: Both (a) and (b)

Ans: (d)

111. RNA functions as

- (a) genetic material    (b) adapter                      (c) catalyser                      (d) All the above

Sol: All the above

Ans: (d)

112. Select the wrong statement from the following

- (a) Both chloroplasts and mitochondria have an internal compartment, bounded by the thylakoid membrane  
 (b) Both chloroplasts and mitochondria contain DNA  
 (c) The chloroplast are generally much larger than mitochondria.

(d) Both chloroplasts and mitochondria contain an inner and outer membrane.

Sol: Both chloroplasts and mitochondria have an internal compartment, bounded by the thylakoid membrane

Ans: (a)

113. Fill the spaces below given sentences and choose the option which matches the spaces A, B, C and D respectively

\_\_\_\_\_ A \_\_\_\_\_ accounts for only a partial breakdown of \_\_\_\_\_ B \_\_\_\_\_ whereas in \_\_\_\_\_ C \_\_\_\_\_ respiration it is completely degraded to \_\_\_\_\_ D \_\_\_\_\_

- (a) Fermentation, Glucose, Aerobic,  $\text{CO}_2$  and  $\text{H}_2\text{O}$
- (b) Aerobic respiration. Alcohol, Fermentation,  $\text{CO}_2$
- (c) Fermentation, Glucose, fermentation,  $\text{H}_2\text{O}$
- (d) Aerobic respiration,  $\text{CO}_2$  and  $\text{H}_2\text{O}$ , Fermentation, Glucose

Sol: Fermentation, Glucose, Aerobic,  $\text{CO}_2$  and  $\text{H}_2\text{O}$

Ans: (a)

114. Gel electrophoresis is used for

- (a) Cutting of DNA into fragments
- (b) Separation of DNA fragments according to their size
- (c) Construction of recombinant DNA by joining with cloning vectors
- (d) Isolation of DNA molecule

Sol: Separation of DNA fragments according to their size

Ans: (b)

115. Probes, used in DNA fingerprinting, are initially

- (a) Double stranded RNA
- (b) Satellite DNA
- (c) Double stranded DNA
- (d) All of the above

Sol: Satellite DNA

Ans: (b)

116. Closing of stomata due to water stress reduces \_\_\_\_\_ leading to drop in photosynthetic rate

- (a)  $\text{O}_2$  availability
- (b)  $\text{CO}_2$  availability
- (c) Chlorophyll availability
- (d) Starch availability

Sol:  $\text{CO}_2$  availability

Ans: (b)

117. NPP (net primary productivity) is highest in

- (a) Tropical region (b) Polar region (c) High altitude (d) Deep ocean

Sol: Tropical region

Ans: (a)

118. Arrange the following in the order of their location from the periphery to centre in the dicotyledons stem

- I. Endodermis II. Metaxylem III. Trichoblasts IV. Phloem

- (a) IV, I, II, III (b) IV, II, III, I (c) I, II, III, IV (d) III, I, IV, II

Sol: III, I, IV, II

Ans: (d)

119. Which of the following ecological pyramids can be inverted?

- (A) Pyramid of energy  
(B) Pyramid of number  
(C) Pyramid of biomass

- (a) Only (A) and (B) (b) Only (B) (c) Only (B) and (C) (d) All (A), (B) and (C)

Sol: Only (B) and (C)

Ans: (c)

120. Which of the following ratios is generally constant for a given species?

- (a)  $A + G / C + T$  (b)  $T + C / A + G$  (c)  $A + C / T + G$  (d)  $G + C / A + T$

Sol:  $G + C / A + T$

Ans: (d)

121. Detritivores break down detritus into smaller particles. This process is called

- (a) fragmentation (b) leaching (c) humification (d) calcification

Sol: fragmentation

Ans: (a)

122. All are features of insect-pollinated flowers except

- (a) Flowers with fragrance (b) Well exposed stamens  
(c) Pollen grain with sticky surface (d) Flowers provide nectar

Sol: Well exposed stamens

Ans: (b)

123. Closed vascular bundles lack

- (a) Ground tissue (b) Conjunctive tissue (c) Cambium (d) Pith

Sol: Cambium

Ans: (c)

124. Bam HI can cut the pBR322 at the region of

- (a) rop (b) amp<sup>R</sup> (c) tet<sup>R</sup> (d) None of the above

Sol: tet<sup>R</sup>

Ans:(c)

125. In the electron transport system present in the inner mitochondrial membrane, complexes I and IV are respectively

- (a) NADH dehydrogenase and FADH<sub>2</sub>  
 (b) NADH<sub>2</sub> and NADH dehydrogenase  
 (c) NADH dehydrogenase and cytochrome - c oxidase complex  
 (d) NADH dehydrogenase and ATP synthase

Sol: NADH dehydrogenase and cytochrome - c oxidase complex

Ans: (c)

126. Tobacco Mosaic Virus (TMV) genes are

- (a) Double stranded RNA (b) Single stranded RNA  
 (c) Polyribunucleotides (d) Proteinaceous

Sol: Single stranded RNA

Ans: (b)

127. Which kind of therapy was given in 1990 to a four-year-old girl with adenosine deaminase (ADA) deficiency?

- (a) Gene therapy (b) Chemotherapy (c) Physiotherapy (d) Radiation therapy

Sol: Gene therapy

Ans: (a)

128. Lateral roots in higher plants arise from

- (a) Endodermis (b) Epidermis (c) Cortex (d) Pericycle

Sol: Pericycle

Ans: (d)

129. Which of following statement is/are true

(a) Methanogens are present in alimentary canal of several ruminant animals like cow & buffaloes

(b) Methanogens are responsible for production of biogas from dung of ruminant animals

(c) Methanogens produce biogas by aerobic respiration.

(d) Both (a) and (b)

Sol: Both (a) and (b)

Ans: (d)

130. Choose the adaptations seen in prey species to avoid over exploitation

- (a) Camouflaged in animals
- (b) Thorns in plants
- (c) Distasteful in Monarch butterfly
- (d) All of these

Sol: All of these

Ans: (d)

131. A nucleosome has

- (a) positively charged DNA and negatively charged protein
- (b) negatively charged DNA and positively charged protein
- (c) Negatively charged protein and DNA
- (d) positively charged protein and DNA

Sol: negatively charged DNA and positively charged protein

Ans: (b)

132. In Pteridophytes, meiosis occurs in

- (a) Egg mother cells
- (b) Zygote
- (c) Antherozoids
- (d) Spore mother cells

Sol: Spore mother cells

Ans: (d)

133. The main arena of cellular activities in both the plant and animal cells is

- (a) cytoplasm
- (b) protoplasm
- (c) Nucleoplasm
- (d) none of the above

Sol: cytoplasm

Ans: (a)

134. Which of these are nucleotides?

- (a) Adenylic and Guanylic acids
- (b) Cytidylic and Uridylic acids
- (c) Uridylic and Thymidylic acids
- (d) All of these

Sol: All of these

Ans: (d)

135. The Proteins encoded by the genes cry I Ac and cry II Ab control the

- (a) Cotton bollworms
- (b) Corn borer
- (c) Nematode
- (d) all of these

Sol: Cotton bollworms



140. Following are the steps of dialysis-

- A. Blood is passed into a vein.
- B. Blood is mixed with heparin.
- C. Blood is mixed with anti-heparin.
- D. Blood is drained from convenient artery.
- E. Blood is passed through a coiled and porous cellophane tube bathing in dialysis fluid.
- F. Removal of nitrogenous wastes from blood

The correct sequence of steps is

- (a)  $A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow F$
- (b)  $F \rightarrow C \rightarrow E \rightarrow B \rightarrow A \rightarrow D$
- (c)  $D \rightarrow B \rightarrow E \rightarrow F \rightarrow C \rightarrow A$
- (d)  $D \rightarrow C \rightarrow E \rightarrow F \rightarrow B \rightarrow A$

Sol:  $D \rightarrow B \rightarrow E \rightarrow F \rightarrow C \rightarrow A$

Ans: (c)

141. Thalassaemia and sickle cell anemia are caused due to a problem in globin molecule synthesis. Select the correct statement.

- (a) Sickle cell anemia is due to a quantitative problem of globin molecules
- (b) Both are due to a qualitative defect in globin chain synthesis
- (c) Both are due to a quantitative defect in globin chain synthesis
- (d) Thalassaemia is due to less synthesis of globin molecules

Sol: Thalassaemia is due to less synthesis of globin molecules

Ans: (d)

142. When a neuron is in resting state i.e, not conducting any impulse, the axonal membrane is:

- (a) Comparatively more permeable to  $\text{Na}^+$  ions and nearly impermeable to  $\text{K}^+$  ions
- (b) Equally permeable to both  $\text{Na}^+$  and  $\text{K}^+$  ions
- (c) Impermeable to both  $\text{Na}^+$  and  $\text{K}^+$  ions
- (d) Comparatively more permeable to  $\text{K}^+$  ions and nearly impermeable to  $\text{Na}^+$  ions

Sol: Comparatively more permeable to  $\text{K}^+$  ions and nearly impermeable to  $\text{Na}^+$  ions

Ans: (d)

143. Which is correct about joint diastole?

- A. Bicuspid and tricuspid valves are open
  - B. Bicuspid and tricuspid valves are closed
  - C. Semilunar valves are open
  - D. Semilunar valves are closed
- (a) A and C                      (b) B and D                      (c) A and D                      (d) B and C

Sol: A and D

Ans: (c)

144. In *Drosophila melanogaster*, the genes white and yellow shows \_\_A\_\_ recombination and genes white and miniature wing shows \_\_\_\_B\_\_\_\_ linkage

- (a) A-98.7%, B-37.2% (b) A-98.7%, B-62.8% (c) A-1.3%, B-37.2% (d) A-1.3%, B-62.8%

Sol: A-1.3%, B-62.8%

Ans: (d)

145. An individual with Down's syndrome has \_\_\_\_\_ copies of 21<sup>st</sup> chromosome.

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

Sol: 3

Ans: (c)

146. Identify the nucleoside from the following:

- A. Adenosine B. Uridylic acid C. Uridine D. Cytidylic acid

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

Sol: A and C only

Ans: (b)

147. Find the incorrect statement from the following

- (a) Introduction of Nile perch in Lake Victoria in east Africa lead to the extinction of more than 200 species of cichlid fish in the lake  
(b) Fast dwindling Amazon forest is estimated to produce, through photosynthesis, 20 per cent of the total oxygen in the earth's atmosphere  
(c) More than 25 per cent of drugs currently sold worldwide are derived from plants  
(d) Illegal introduction of American catfish *Clarias gariepinus* for aquaculture purpose is posing threat to indigenous cat fishes in our rivers

Sol: Illegal introduction of American catfish *Clarias gariepinus* for aquaculture purpose is posing threat to indigenous cat fishes in our rivers

Ans: (d)

148. Both the lobes of thyroid gland are interconnected with

- (a) Connective tissue called the stromal tissue. (b) Connective tissue called the thyroid tissue.  
(c) Connective tissue called follicle tissue (d) Connective tissue called the isthmus tissue

Sol: Connective tissue called the isthmus tissue

Ans: (d)

149. Choose the correct statement/s regarding malaria:

- (i) Malignant malaria is caused by *Plasmodium vivax*
- (ii) Fertilization and development of Plasmodium take place in the mosquito's gut
- (iii) Sporozoites reproduce sexually in hepatocytes
- (iv) Gametocytes develop in RBCs.

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

Sol: ii and iv only

Ans: (d)

150. With the disintegration of corpus luteum, a decrease in the secretion of ----- hormone occurs.

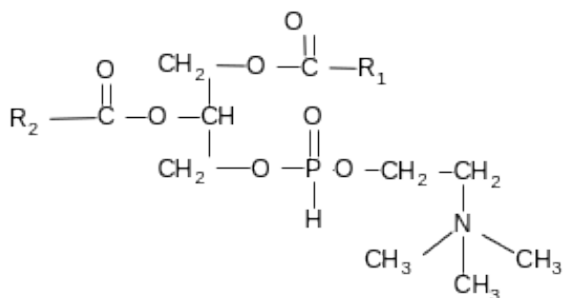
(a) LH                      (b) Progesterone                      (c) LTH                      (d)FSH

Sol: Progesterone

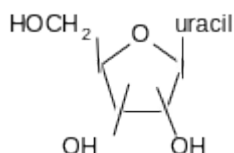
Ans: (b)

151. Identify the molecule (1) and (2) shown below and select the right option giving their name and occurrence.

(1)



(2)



- (a) (1) lecithin - Cell membrane                      (b) (2) Uridylic acid - RNA
- (c) (1) Triglyceride - DNA                      (d) (2) Uracil - DNA

Sol: (1) lecithin - Cell membrane

Ans: (a)

152. In which contraceptive method, the semen will be without sperms?

(a) Condoms                      (b) Withdrawal coitus (c) Foams                      (d) Vasectomy

Sol: Vasectomy

Ans: (d)

153. If a genetic disease is transferred from a phenotypically normal but carrier female to only some of its male progeny. The disease is

- (a) Autosomal dominant (b) Autosomal recessive  
(c) Sex-linked dominant (d) Sex-linked recessive

Sol: Sex-linked recessive

Ans: (d)

154. Respiration by lungs takes place in

- (a) *Rana*, *Chelone* and *Columba* (b) *Carchardon*, *Hyla* and *Corvus*  
(c) *Canis*, *Crocodiles* and *Pristis* (d) *Myxine*, *Salamandra* and *Panthera*

Sol: *Rana*, *Chelone* and *Columba*

Ans: (a)

155. The amount of filtrate formed by kidneys is

- (a) 125 mL/minute (b) 180 L/hr (c) 125 L/day (d) 180 mL/second

Sol: 125 mL/minute

Ans: (a)

156. **Assertion:** The final stage of meiotic prophase I is diplotene.

**Reason:** Diplotene is marked by terminalisation of chiasmata.

- (a) Both assertion and reason are true and reason is the correct explanation of assertion  
(b) Both assertion and reason are true and reason is not the correct explanation of

assertion

- (c) Assertion is true but reason is false  
(d) Both assertion and reason are false

Sol: Both assertion and reason are false

Ans:(d)

157. The triangular bone scapula is found on

- (a) dorsal part of thorax between 2<sup>nd</sup> and 7<sup>th</sup> ribs  
(b) ventral part of thorax between 2<sup>nd</sup> and 7<sup>th</sup> ribs  
(c) medial part of thorax between 2<sup>nd</sup> and 7<sup>th</sup> ribs  
(d) None of the above

Sol: dorsal part of thorax between 2<sup>nd</sup> and 7<sup>th</sup> ribs

Ans: (a)

158. In humans, placenta is derived from

- (a) Yolk sac (b) Amnion (c) Allantois (d) Chorion

Sol: Chorion

Ans: (d)

159. In the tissues, high concentration of carbon dioxide

- (a) increases the affinity of haemoglobin to both oxygen and hydrogen
- (b) increases the affinity of haemoglobin to oxygen but decreases its affinity to hydrogen
- (c) decreases the affinity of haemoglobin to oxygen but increases its affinity to hydrogen
- (d) decreases the affinity of haemoglobin to both oxygen and hydrogen

Sol: decreases the affinity of haemoglobin to oxygen but increases its affinity to hydrogen

Ans: (c)

160. Which type of white blood cells are concerned with the release of histamine and the natural anti-coagulant heparin?

- (a) Neutrophils
- (b) Basophils
- (c) Eosinophils
- (d) Monocytes

Sol: Basophils

Ans: (b)

161. Select the incorrect match with respect to recent extinction of animals

- (a) Quagga - Africa
- (b) Thylacine - Australia
- (c) Steller's sea cow - Russia
- (d) Dodo - India

Sol: Dodo - India

Ans: (d)

162. Following features belong to which syndrome?

- (I) Furrowed tongue
- (II) Palm is broad with characteristic palm crease
- (III) Physical and mental retardation
- (IV) Short statured with small round head
- (a) Down's syndrome
- (b) Turner's syndrome
- (c) Klinefelter's syndrome
- (d) Cri du chat syndrome

Sol: Down's syndrome

Ans: (a)

163. Primates called Dryopithecus and Ramapithecus were existing about

- (a) 1 mya
- (b) 15 mya
- (c) 5 mya
- (d) 2.5 mya

Sol: 15 mya

Ans: (b)

164. Identify the correct sequence of stages in the evolution of modern humans

- (i) Neanderthal man
- (ii) Cro-Magnon man
- (iii) Australopithecines

- (iv) Homo habilis                      (v) Homo erectus                      (vi) Modern human  
 (a) iv, iii, v, ii, i, vi      (b) iii, v, iv, ii, i, vi      (c) iii, iv, v, i, ii, vi      (d) iii, iv, v, ii, i, vi

Sol: iii, iv, v, i, ii, vi

Ans: (c)

165. Which one of the following is the correct match of events occurring during menstrual cycle?

- (a) Menstruation: Breakdown of myometrium & ovum not fertilized.  
 (b) Proliferative phase: Rapid regeneration of myometrium & maturation of Graffian follicle

follicle

- (c) Development of corpus luteum: Secretory phase & increased secretion of progesterone

(d) Ovulation: LH and FSH attain peak level & sharp rise in the secretion of progesterone

Sol: Development of corpus luteum: Secretory phase & increased secretion of progesterone

Ans: (c)

166. The colonization of tropical Pacific Islands by humans is said to have led to the extinction of more than

- (a) 1,200 species of native birds                      (b) 1,300 species of native birds  
 (c) 1,400 species of native birds                      (d) 2,000 species of native birds

Sol: 2,000 species of native birds

Ans: (d)

167. In animals, specialized cells for osmoregulation and excretion was first seen in

- (a) Annelida                      (b) Coelenterata                      (c) Mollusca                      (d)

Platyhelminthes

Sol: Platyhelminthes

Ans:(d)

168. Which of the following statement is not correct?

- (a) Myelinated nerve fibres are found in spinal and cranial nerves  
 (b) Myelinated nerve fibres is enclosed by a Schwann cell  
 (c) Afferent nerve fibres transmit impulses from CNS to organs  
 (d) Somatic neural system relays impulses from the CNS to skeletal muscles

Sol: Afferent nerve fibres transmit impulses from CNS to organs

Ans: (c)

169. Diaphragms are contraceptive devices used by the females. Choose the correct option from the statements given below.

- (i) They are introduced into the uterus.
- (ii) They are placed to cover the cervical region.
- (iii) They act as physical barriers for sperm entry.
- (iv) They act as spermicidal agents.

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

Sol: (ii) and (iii)

Ans: (c)

170. Inspiration occurs when there is a negative pressure in the lungs with respect to atmospheric pressure. This negative pressure is achieved when

- (a) Intrapulmonary pressure is less than the atmospheric pressure
- (b) Intra pulmonary pressure is greater than the atmospheric pressure
- (c) Intrapulmonary pressure is equal to the atmospheric pressure
- (d) None of the above

Sol: Intrapulmonary pressure is less than the atmospheric pressure

Ans: (a)

171. The universal donor and acceptor will be \_\_\_\_\_

- (a)  $O^-$  and  $AB^-$                       (b)  $O^-$  and  $AB^+$                       (c)  $O^+$  and  $AB^-$   
(d)  $O^+$  and  $AB^+$

Sol:  $O^-$  and  $AB^+$

Ans: (b)

172. Which statement is true about the walls of the uterus?

- (a) It has a thick membranous external wall called the perimetrium
- (b) It has a thin middle layer of smooth muscles called the myometrium
- (c) It has an inner glandular layer called the endometrium
- (d) All are true

Sol: It has an inner glandular layer called the endometrium

Ans: (c)

173. This hormone, though synthesized elsewhere, is stored and released by the master gland

- (a) Luteinizing hormone                      (b) Antidiuretic hormone  
(c) Prolactin                      (d) Melanocyte stimulating hormone

Sol: Antidiuretic hormone

Ans: (b)

174. David Tilman's long-term ecosystem experiments using outdoor plots showed that
- (a) Increased diversity contributed to lower productivity
  - (b) Increased diversity contributed to higher productivity
  - (c) Increased diversity have no impact on productivity
  - (d) Increased diversity have unpredictable impact on productivity

Sol: Increased diversity contributed to higher productivity

Ans: (b)

175. Identify the odd one from the list of organisms given below

(a) *Hyla* (b) *Salamandra* (c) *Icthyopis* (d)

*Calotes*

Sol: *Calotes*

Ans: (d)

176. Identify the autoimmune disease among the following.

(a) Myasthenia gravis (b) Albinism  
(c) Muscular dystrophy (d) Endemic goitre

Sol: Myasthenia gravis

Ans:(a)

177. Find the incorrect match between the disease listed and its mode of transmission.

(a) Typhoid: Contaminated food and water  
(b) Pneumonia: droplet infection  
(c) Malaria: female Anopheles  
(d) Elephantiasis: Sharing towels, cloths, comb of infected individual

Sol: Elephantiasis: Sharing towels, cloths, comb of infected individual

Ans:(d)

178. Gynaecomastia is a characteristic of

(a) A genetic disorder caused by trisomy of sex chromosome in females  
(b) A genetic disorder caused by trisomy of autosomal chromosome in females  
(c) A genetic disorder caused by trisomy of sex chromosome in males  
(d) A genetic disorder caused by trisomy of autosomal chromosome in males

Sol: A genetic disorder caused by trisomy of sex chromosome in males

Ans: (c)

179. The corticoids, which are involved in carbohydrate metabolism and which are involved in regulation of balance of water and electrolyte in our body are called

- (a) Gonadocorticoids and mineralocorticoids respectively
- (b) Glucocorticoids and Gonadocorticoids respectively
- (c) Mineralocorticoids and glucocorticoids respectively
- (d) Glucocorticoids and mineralocorticoids respectively

Sol: Glucocorticoids and mineralocorticoids respectively

Ans: (d)

180. Where was the World Summit on sustainable development held?

- (a) South Africa
- (b) USA
- (c) South Korea
- (d) UK

Sol: South Africa

Ans: (a)

**Key Answers:**

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