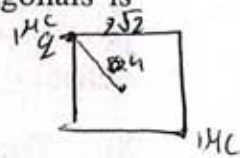
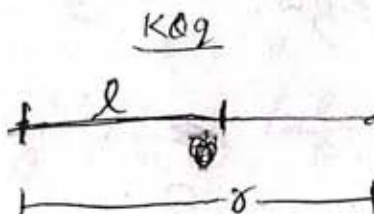


## PHYSICS

- 1) One moving electron when comes closer to other stationary electron, then its kinetic energy and potential energy respectively \_\_\_\_\_ and \_\_\_\_\_.
- (A) increases, increases                      (B) increases, decreases  
 (C) decreases, increases                      (D) decreases, decreases
- 2) An inclined plane of length 5.60 m making an angle of  $45^\circ$  with the horizontal is placed in an uniform electric field  $E = 100 \text{ Vm}^{-1}$ . A particle of mass 1 kg and charge  $10^{-2} \text{ C}$  is allowed to slide down from rest position from maximum height of slope. If the co-efficient of friction is 0.1, the time taken by the particle to reach the bottom is \_\_\_\_\_.
- (A) 1 s    (B) 1.41 s  
 (C) 2 s    (D) None of these
- 3) Charges  $1 \mu\text{C}$  are placed at each of the four corners of a square of side  $2\sqrt{2} \text{ m}$ . The potential at the point of intersection of the diagonals is \_\_\_\_\_ ( $K = 9 \times 10^9 \text{ SI unit}$ )
- (A)  $18 \times 10^3 \text{ V}$                               (B) 1800 V  
 (C)  $18\sqrt{2} \times 10^3 \text{ V}$                       (D) None of these
- 4) A point charge  $q$  is situated at a distance  $r$  on axis from one end of a thin conducting rod of length  $L$  having a charge  $Q$  [Uniformly distributed along its length]. The magnitude of electric force between the two is \_\_\_\_\_.
- (A)  $\frac{KQq}{r^2}$                                       (B)  $\frac{2KQ}{r(r+L)}$   
 (C)  $\frac{KQq}{r(r-L)}$                                       (D)  $\frac{KQq}{r(r+L)}$



(Space for Rough Work)



$$\frac{K \cdot 9 \times 10^9 \times 10^{-6} \times 10^{-6}}{16}$$

$$q:1 \quad \frac{v_1}{2v} = \frac{\lambda_2}{\lambda_1} \quad \left(\frac{v_1}{v_2}\right)^2 = \frac{\lambda_2}{\lambda_1} \quad \lambda \propto \frac{1}{v}$$

- 5) If alpha particle and deuteron move with velocity  $v$  and  $2v$  respectively, the ratio of their de - Broglie wave length will be \_\_\_\_\_.

- (A) 2 : 1 (B) 1 :  $\sqrt{2}$   
(C) 1 : 1 (D)  $\sqrt{2}$  : 1

- 6) de - Broglie wave length of atom at TK absolute temperature will be

- (A)  $\frac{h}{\sqrt{3mKT}}$  (B)  $\frac{h}{mKT}$   
(C)  $\frac{\sqrt{2mKT}}{h}$  (D)  $\sqrt{2mKT}$

- 7) If the wave length of light is  $4000\text{\AA}$ , then the number of waves in 1 mm length will be \_\_\_\_\_.  $10^9 \text{ m}$   $\lambda = 4000 \text{\AA}$

- (A) 2500 (B) 25  
(C) 250 (D) 25000

- 8) The frequencies of X rays,  $\gamma$  rays and Ultra violet rays are respectively  $p$ ,  $q$  and  $r$  then

- (A)  $p > q, q > r$  (B)  $p < q, q > r$   
(C)  $p < q, q < r$  (D)  $p > q, q < r$

- 9) Photons having energy 1eV and 2.5 eV successively incident on a metal having work function is 0.5 eV. The ratio of maximum speed of emitted electrons is

- (A) 2 : 1 (B) 1 : 2  
(C) 3 : 1 (D) 1 : 3

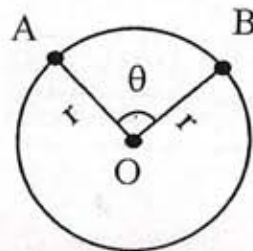
(Space for Rough Work)

$$W = 0.5 \text{ eV} \quad \frac{1}{2} mv^2$$

2

5

- 10) A and B are two points on a uniform ring of radius  $r$ . The resistance of the ring is  $R$ .  $\angle AOB = \theta$  as shown in the figure. The equivalent resistance between points A & B is \_\_\_\_\_.



- (A)  $\frac{R(2\pi - \theta)}{4\pi}$  (B)  $\frac{R\theta}{2\pi}$   
 (C)  $R\left(1 - \frac{\theta}{2\pi}\right)$  (D)  $\frac{R}{4\pi^2}(2\pi - \theta)\theta$

- 11) Two wires of equal length and equal diameter and having resistivities  $\rho_1$  and  $\rho_2$  are connected in series. The equivalent resistivity of the combination is \_\_\_\_\_.

- (A)  $\frac{\rho_1 + \rho_2}{2}$  (B)  $(\rho_1 + \rho_2)$   
 (C)  $\frac{\rho_1 \rho_2}{\rho_1 + \rho_2}$  (D)  $\sqrt{\rho_1 \rho_2}$

(Space for Rough Work)

$$R + R.$$

$$\frac{\rho_1 l}{A} + \frac{\rho_2 l}{A}$$

12) Match the following two columns.

Column I		Column II	
a)	Electrical resistance	p)	$ML^3T^{-3}A^{-2}$
b)	Electrical potential	q)	$ML^2T^{-3}A^{-2}$
c)	Specific resistance	r)	$ML^2T^{-3}A^{-1}$
d)	Specific conductance	s)	None of these

(A)  $a-q, b-r, c-p, d-s$

(B)  $a-q, b-s, c-r, d-p$

(C)  $a-p, b-q, c-s, d-r$

(D)  $a-p, b-r, c-q, d-s$

$R = \frac{V}{I} = \frac{ML^2T^{-3}A^{-1}}{AT^{-1}} = ML^2T^{-3}A^{-1}$

13) Angle of minimum deviation for a prism of refractive index 1.5 is equal to the angle of prism of given prism. Then the angle of prism is \_\_\_\_\_

( $\sin 48^\circ 36' = 0.75$ )

(A)  $80^\circ$

(B)  $41^\circ 24'$

(C)  $60^\circ$

(D)  $82^\circ 48'$

14) A ray of light passes from a medium A having refractive index 1.6 to the medium B having refractive index 1.5. The value of critical angle of medium A is \_\_\_\_\_.

(A)  $\sin^{-1} \sqrt{\frac{16}{15}}$

(B)  $\sin^{-1} \left( \frac{16}{15} \right)$

(C)  $\sin^{-1} \left( \frac{1}{2} \right)$

(D)  $\sin^{-1} \left( \frac{15}{16} \right)$

(Space for Rough Work)

15) The power of plane mirror is \_\_\_\_\_.

(A) 0

(B)  $\infty$

(C) 2D

(D) 4D

16) Light waves travel from optically rarer medium to optically denser medium. Its velocity decreases because of change in \_\_\_\_\_

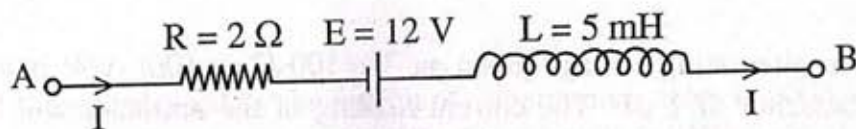
(A) wavelength

(B) frequency

(C) amplitude

(D) phase

17) The Network shown in Figure is a part of the circuit. (The battery has negligible resistance)



At a certain instant the current  $I = 2 \text{ A}$  and it is decreasing at the rate of  $10^2 \text{ As}^{-1}$ . What is the potential difference between the points B and A?

(A) 8.5 V

(B) 8.0 V

(C) 10 V

(D) 15 V

18) A rod of 10 cm length is moving perpendicular to uniform magnetic field of intensity  $5 \times 10^{-4} \text{ Wb/m}^2$ . If the acceleration of the rod is  $5 \text{ m/s}^2$ , then the rate of increase of induced emf is \_\_\_\_\_.

(A)  $25 \times 10^{-4} \text{ Vs}$

(B)  $2.5 \times 10^{-4} \text{ Vs}^{-1}$

(C)  $20 \times 10^{-4} \text{ Vs}$

(D)  $20 \times 10^{-4} \text{ Vs}^{-1}$

(Space for Rough Work)

$\mathcal{E} =$

$$B = 5 \times 10^{-4}$$

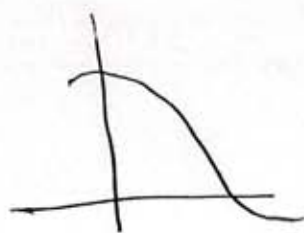
$$l = 10 \text{ cm} = 0.1 \text{ m}$$

$$F = \frac{m}{a}$$

$$a = \frac{m}{F}$$

- 19) A current of  $\frac{25}{\pi}$  Hz frequency is passing through an A.C. circuit having series combination of  $R = 100 \Omega$  and  $L = 2 \text{ H}$ , the phase difference between voltage and current is \_\_\_\_\_
- (A)  $60^\circ$  (B)  $90^\circ$   
(C)  $30^\circ$  (D)  $45^\circ$
- 20) In A.C. circuit having only capacitor, the current \_\_\_\_\_
- (A) leads the voltage by  $\frac{\pi}{2}$  in phase  
(B) lags behind the voltage by  $\frac{\pi}{2}$  in phase  
(C) leads the voltage by  $\pi$  in phase  
(D) lags behind the voltage by  $\pi$  in phase
- 21) An alternating voltage given as  $V = 100\sqrt{2} \sin 100t$  volt is applied to a capacitor of  $1 \mu\text{F}$ . The current reading of the ammeter will be equal to \_\_\_\_\_ mA.
- (A) 20 (B) 10  
(C) 40 (D) 80
- $C = 1 \mu\text{F}$   
 $V =$
- 22) The distance of the closest approach of an alpha particle fired at a nucleus with kinetic energy  $K$  is  $r_0$ . The distance of the closest approach when the  $\alpha$  particle is fired at the same nucleus with kinetic energy  $2K$  will be
- (A)  $4r_0$  (B)  $\frac{r_0}{2}$   
(C)  $\frac{r_0}{4}$  (D)  $2r_0$

(Space for Rough Work)

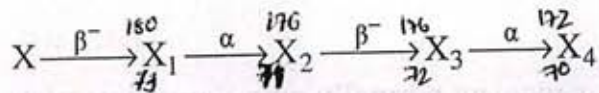


$$\frac{\frac{1}{2}mv^2}{\frac{1}{2}m}$$

23) Number of spectral line in hydrogen atom is

- (A) 8 (B) 6  
(C) 15 (D)  $\alpha$

24) A radioactive element X disintegrates successively as under



If atomic number and atomic mass number of X are respectively 72 and 180, what are the corresponding values for  $X_4$ ?

- (A) 69, 172 (B) 69, 176  
(C) 71, 176 (D) 70, 172

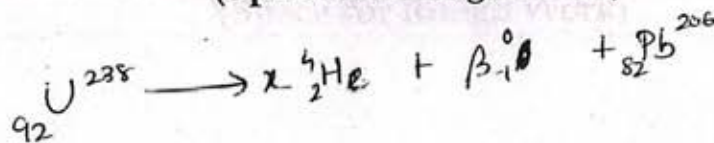
25) The energy released by the fission of one uranium atom is 200 MeV. The number of fission per second required to produce 6.4 W power is \_\_\_\_\_.

- (A)  $2 \times 10^{11}$  (B)  $10^{11}$   
(C)  $10^{10}$  (D)  $2 \times 10^{10}$

26) If by successive disintegration of  ${}_{92}\text{U}^{238}$ , the final product obtained is  ${}_{82}\text{Pb}^{206}$ , then how many number of  $\alpha$  and  $\beta$  particles are emitted?

- (A) 6 and 8 (B) 8 and 6  
(C) 12 and 6 (D) 8 and 12

(Space for Rough Work)



$$238 = \frac{206}{32} \times x + y$$

$$92 = 82 + 16 - 6$$

- 27) A change of 0.04 V takes place between the base and the emitter when an input signal is connected to the CE transistor amplifier. As a result,  $20 \mu\text{A}$  change take place in the base current and a change of 2 mA takes place in the collector current. Find the input resistance and A.C. current gain.
- (A)  $1\text{k}\Omega$ , 100 (B)  $2\text{k}\Omega$ , 100  
(C)  $2\text{k}\Omega$ , 200 (D)  $1\text{k}\Omega$ , 200
- 28) A plane polarized light is incident normally on a tourmaline plate. Its E vectors make an angle of  $60^\circ$  with the optic axis of the plate. Find the percentage difference between initial and final intensities.
- (A) 50% (B) 25%  
(C) 75% (D) 90%
- 29) Light of wave length  $\lambda$  is incident on slit of width  $d$ . The resulting diffraction pattern is observed on a screen placed at distance  $D$ . The linear width of central maximum is equal to width of the slit, then  $D =$  \_\_\_\_\_
- (A)  $\frac{2\lambda^2}{d}$  (B)  $\frac{d^2}{2\lambda}$   
(C)  $\frac{d}{\lambda}$  (D)  $\frac{2\lambda}{d}$

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(Space for Rough Work)



30) In a N-P-N transistor about  $10^{10}$  electrons enter the emitter in  $2\mu\text{s}$ , when it is connected to a battery. Then  $I_E =$  \_\_\_\_\_  $\mu\text{A}$ .

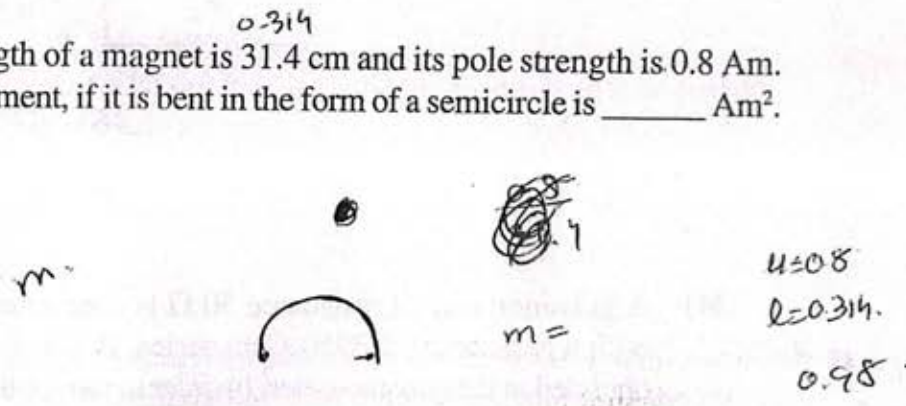
- (A) 400
- (B) 200
- (C) 800
- (D) 1600

~~200~~

$$\frac{10^{10} \times 1.6 \times 10^{-19}}{2 \times 10^{-6}} = 8 \times 10^{-20+16}$$

31) The effective length of a magnet is 31.4 cm and its pole strength is 0.8 Am. The magnetic moment, if it is bent in the form of a semicircle is \_\_\_\_\_  $\text{Am}^2$ .

- (A) 1.2
- (B) 1.6
- (C) 0.16
- (D) 0.12



32) Equal currents are passing through two very long and straight parallel wires in the same direction. They will \_\_\_\_\_.

- (A) attract each other
- (B) repel each other
- (C) lean towards each other
- (D) neither attract nor repel each other



(Space for Rough Work)



36) Which gate can be obtained by shorting both the input terminals of a NOR gate.

(A) NOT

(B) OR

(C) AND

(D) NAND

37) An optical fiber can offer a band width of \_\_\_\_\_.

(A) 100 GHz

(B) 100 MHz

(C) 750 MHz

(D) 250 MHz

38) To transmit a signal of 3 KHz frequency, the minimum length of antenna is \_\_\_\_\_ km

(A) 25

(B) 20

(C) 50

(D) 75

$$\frac{3 \times 10^3}{3 \times 10^3} = 10^5$$

$$\frac{25000}{4}$$

39) 27 identical drops of mercury are charged simultaneously with the same potential of 10 Volt. Assuming the drop to be spherical, if all the charged drops are made to combine to form one large drop, then its potential will be \_\_\_\_\_ Volt.

(A) 40

(B) 90

(C) 160

(D) 10

40) When  $10^{19}$  electrons are removed from a neutral metal plate through some process, the charge on it becomes \_\_\_\_\_.

(A) +1.6 C

(B) -1.6 C

(C)  $10^{19}$  C

(D)  $10^{-19}$  C

(Space for Rough Work)

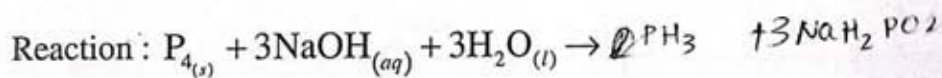
$$10^{19} \times 1.6 \times 10^{-19}$$

## CHEMISTRY

41) Which method is used to get very pure germanium used in semiconductor?

- (A) vapour - phase refining
- (B) electrolysis
- (C) liquation
- (D) zone - refining

42) Which product will be obtained in the following reaction?



- (A)  $PH_3 + 3NaH_2PO_2$  ✓
- (B)  $PH_3 + 3NaH_2PO_2$  ✗
- (C)  $2PH_3 + 3NaH_2PO_2$  ✗
- (D)  $2PH_3 + 3NaH_2PO_2$  ✗

43) The molecular formulae for phosgene and tear gas are \_\_\_\_\_ and \_\_\_\_\_ respectively.

- (A)  $COCl_2$  and  $CCl_2NO_2$  ✗
- (B)  $SOCl_2$  and  $CCl_2NO_2$  ✓
- (C)  $COCl_2$  and  $CCl_3NO_2$  ✓
- (D)  $SOCl_2$  and  $CCl_3NO_2$  ✗

44) Which of the following mixture is called Aquaregia?

- (A) Three parts of dil. HCl and 1 part of conc.  $HNO_3$
- (B) Two parts of conc. HCl and two parts of conc.  $HNO_3$
- (C) Three parts of conc. HCl and 1 part of dil.  $HNO_3$
- (D) Three parts of conc. HCl and 1 part of conc.  $HNO_3$

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(Space for Rough Work)

- 45) Which of the following is allylic halide?  
(A) (1 - bromo ethyl) benzene HX  
(B) Benzyl chloride  
(C) 1 - bromo benzene  
(D) 3 - chloro cyclo hex-1-ene
- 46) 50% of the reagent is used for dehydrohalogenation of 6.45 gm  $\text{CH}_3\text{CH}_2\text{Cl}$ .  
What will be the weight of the main product obtained?  
[At. mass of H, C and Cl are 1, 12 & 35.5 gm/mole<sup>-1</sup> respectively]  
(A) 1.4 gm (B) 0.7 gm  
(C) 2.8 gm (D) 5.6 gm
- 47) Name the following reaction  $\text{CH}_3\text{CH}_2\text{Cl} + \text{NaI} \xrightarrow{\text{acetone}} \text{CH}_3\text{CH}_2\text{I} + \text{NaCl}$   
(A) Frinkel-stein reaction  
(B) Swartz reaction  
(C) Wurtz reaction ✓  
(D) Hell-Volhard Zelinsky reaction
- 48) Which reagent is used for bromination of methyl phenyl ether?  
(A)  $\text{Br}_2 / \text{CH}_3\text{COOH}$   
(B)  $\text{Br}_2 / \text{Red P}$   
(C)  $\text{Br}_2 / \text{FeBr}_3$   
(D)  $\text{HBr} / \Delta$

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(Space for Rough Work)

49) Which of the following acid does not have  $-\text{COOH}$  group?

(A) Picric acid ~~✓~~

(B) Ethanoic acid ✓

(C) Benzoic acid

(D) Salicylic acid ✓

50) Which of the following statement is not correct?

(A) Phenol is neutralised by sodium carbonate

(B) Phenol is used to prepare analgesic drugs ✓

(C) Solubility of phenol in water is more than that of chlorobenzene ✓

(D) Boiling point of o-nitrophenol is lower than that of p-nitrophenol ✓

51) Total order of reaction  $X + Y \rightarrow XY$  is 3. The order of reaction with respect to X is 2. State the differential rate equation for the reaction.

(A)  $-\frac{d[X]}{dt} = K[X]^0[Y]^3$

(B)  $-\frac{d[X]}{dt} = K[X]^3[Y]^0$

(C)  $-\frac{d[X]}{dt} = K[X]^2[Y]$

(D)  $-\frac{d[X]}{dt} = K[X][Y]^2$

52)  $X \xrightarrow{\text{Step-I}} Y \xrightarrow[\text{slow}]{\text{Step-II}} Z$  is a complex reaction. Total order of reaction is 2 and Step - II is slow step. What is molecularity of Step-II?

(A) 2

(B) 1 ✓

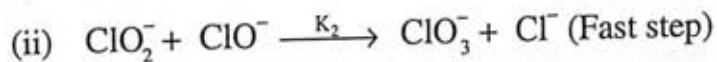
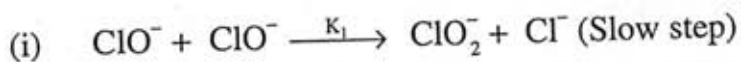
(C) 3

(D) 4

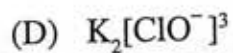
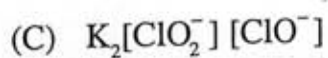
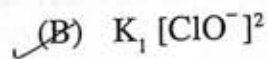
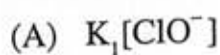
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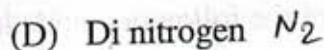
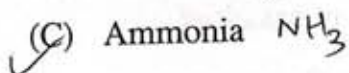
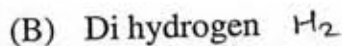
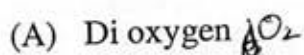
53) Reaction  $3\text{ClO}^- \rightarrow \text{ClO}_3^- + 2\text{Cl}^-$  occurs in following two steps.



then the rate of given reaction = \_\_\_\_\_.



54) At given temperature and pressure adsorption of which gas of the following will take place the most?



55) Which type of colloid is the dissolution of sulphur ( $\text{S}_8$ )?

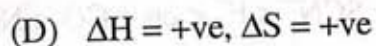
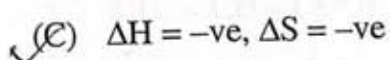
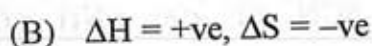
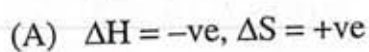
(A) Micelle

(B) Associated colloid

(C) Multimolecular colloid

(D) Macromolecular colloid

56) For Adsorption phenomenon,



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(Space for Rough Work)





- 61) Which of the following complex is paramagnetic?
- (A)  $[\text{Co}(\text{NH}_3)_6]^{3+}$  (B)  $[\text{Ni}(\text{CO})_4]$   
 (C)  $[\text{Ni}(\text{CN})_4]^{2-}$  (D)  $[\text{NiCl}_4]^{2-}$
- 62) Both  $[\text{Ni}(\text{CO})_4]$  and  $[\text{Ni}(\text{CN})_4]^{2-}$  are diamagnetic. The types of hybridisation of Ni in these complexes are \_\_\_\_\_ & \_\_\_\_\_ respectively.
- (A)  $sp^3, dsp^2$  (B)  $sp^3, sp^3$   
 (C)  $dsp^2, sp^3$  (D)  $dsp^2, dsp^2$  ✓
- 63) Which of the following order of acidic strength is not correct?
- (A)  $\text{CH}_3\text{-CH}_2\text{-CH}\cdot\text{COOH} > \text{CH}_3\text{-CH}\cdot\text{CH}_2\text{-COOH} > \text{CH}_2\text{-CH}_2\text{-CH}_2\text{-COOH}$
- (B)  $\begin{array}{c} | \\ \text{Cl} \end{array} \text{C}\cdot\text{COOH} > \begin{array}{c} | \\ \text{Cl} \end{array} \text{CH}\cdot\text{COOH} > \begin{array}{c} | \\ \text{Cl} \end{array} \text{CH}_2\cdot\text{COOH}$
- (C)  $\text{H}\cdot\text{COOH} > \text{CH}_3\text{COOH} > \text{C}_6\text{H}_5\text{COOH}$
- (D)  $\text{CH}_3\text{COOH} > \text{CH}_3\text{-CH}_2\text{-COOH} > (\text{CH}_3)_2\text{-CH}\cdot\text{COOH}$
- 64) What is the formula of Acrolein?
- (A)  $\text{CH}_2 = \text{CH} - \text{CN}$   
 (B)  $\text{CH}_2 = \text{CH} - \text{CHO}$   
 (C)  $\text{CH}_2 = \text{CH} - \text{COOH}$   
 (D)  $\text{CH}_2 = \text{CH} - \text{CONH}_2$

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(Space for Rough Work)

65) What is IUPAC name for isophthalic acid?

- (A) Benzene - 1, 2 dicarboxylic acid  
(B) Benzene - 1, 3 dicarboxylic acid  
(C) Benzene - 1, 4 dicarboxylic acid  
(D) Benzene - 1, 5 dicarboxylic acid

66) What is the name for red azo dye?

- (A)  $\beta$  - naphthyl azo benzene  
(B) p - hydroxy azo benzene  
(C) p - amino azo benzene  
(D) p - N, N dimethyl amino azo benzene

67) Which of the following is not formed by Sandmeyer reaction?

- (A)  $C_6H_5I$                       (B)  $C_6H_5Cl$   
(C)  $C_6H_5Br$                        (D)  $C_6H_5CN$

68) For which vitamin liver is not the source?

- (A) Vitamin -  $B_2$                       (B) Vitamin -  $B_1$   
 (C) Vitamin -  $B_{12}$                       (D) Vitamin - H

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(Space for Rough Work)

69) In which of the following compound, all the monosaccharide units are not joined by  $C_1 - O - C_4$  chain.

(A) Lactose

(B) Maltose

(C) Cellulose

(D) Amylopectin

70) Which of the following polymer is formed by cationic addition polymerisation reaction?

(A) Poly styrene

(B) Butyl rubber

(C) Teflon

(D) PVC

71) Which of the following polymer is used in pigment?

(A) Neoprene

(B) Buna - S

(C) Teflon

(D) Orlon

72) To prevent food from spoilage by microorganism, which substance is used?

(A) Arneto

(B) Aspartame

(C) Salt of sorbic acid

(D) Tetrazine

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(Space for Rough Work)

- 73) Which of the following defect is seen in FeO?
- (A) Metal deficiency defect
  - (B) Metal excess defect
  - (C) Displacement defect
  - (D) Impurity defect
- 74) Which of the following substance possess antiferromagnetic property?
- (A)  $\text{CrO}_2$
  - (B)  $\text{Fe}_3\text{O}_4$
  - (C)  $\text{H}_2\text{O}$
  - (D)  $\text{MnO}$
- 75) The boiling points for aqueous solutions of sucrose and urea are same at constant temperature. If 3 gm of urea is dissolved in its 1 litre solution, what is the weight of sucrose dissolved in its 1 litre solution?  
[Urea - 60 gm/mole, sucrose = 342 gm/mole]
- (A) 17.1 gram
  - (B) 3.0 gram
  - (C) 6.0 gram
  - (D) 34.2 gram
- 76) Which option is inconsistent for Raoult's law?
- (A) The change in heat of dilution for solution = 0
  - (B) Volume of liquid solvent + volume of liquid solute = volume of solution.
  - (C) Solute does not undergo association in solution
  - (D) Solute undergoes dissociation in solution

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(Space for Rough Work)