

**FINAL JEE-MAIN EXAMINATION – APRIL, 2024**
**(Held On Saturday 06<sup>th</sup> April, 2024)**
**TIME : 9 : 00 AM to 12 : 00 NOON**
**CHEMISTRY**
**TEST PAPER WITH ANSWER**
**SECTION-A**

61. Functional group present in sulphonic acid is :

- (1)  $\text{SO}_4\text{H}$  (2)  $\text{SO}_3\text{H}$   
 (3)  $\text{-S-OH}$  (4)  $\text{-SO}_2$   
 $\text{||}$   
 $\text{O}$

Ans. (2)

62. Match List I with List II :

| List I<br>(Molecule / Species) |                          | List II<br>(Property / Shape) |              |
|--------------------------------|--------------------------|-------------------------------|--------------|
| A.                             | $\text{SO}_2\text{Cl}_2$ | I.                            | Paramagnetic |
| B.                             | $\text{NO}$              | II.                           | Diamagnetic  |
| C.                             | $\text{NO}_2^-$          | III.                          | Tetrahedral  |
| D.                             | $\text{I}_3^-$           | IV.                           | Linear       |

 Choose the **correct** answer from the options given below :

- (1) A-IV, B-I, C-III, D-II  
 (2) A-III, B-I, C-II, D-IV  
 (3) A-II, B-III, C-I, D-IV  
 (4) A-III, B-IV, C-II, D-I

Ans. (2)

63. Given below are two statements :

**Statement I :** Picric acid is 2, 4, 6-trinitrotoluene.

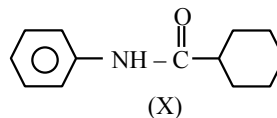
**Statement II :** Phenol-2, 4-disulphuric acid is treated with conc.  $\text{HNO}_3$  to get picric acid.

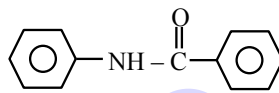
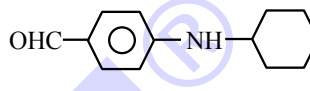
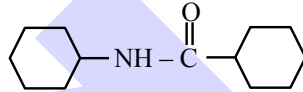
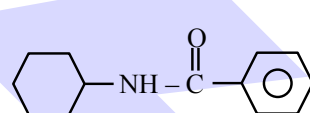
 In the light of the above statement, choose the **most appropriate** answer from the options given below :

- (1) Statement I is incorrect but Statement II is correct.  
 (2) Both Statement I and Statement II are incorrect.  
 (3) Statement I is correct but Statement II is incorrect.  
 (4) Both Statement I and Statement II are correct.

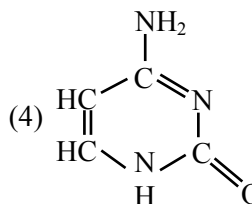
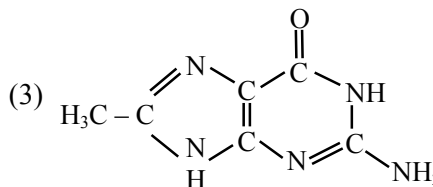
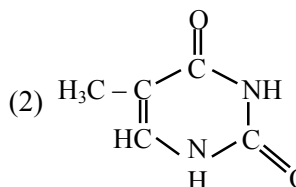
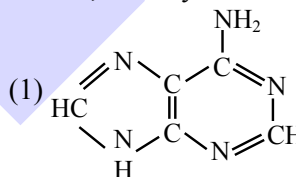
Ans. (1)

64. Which of the following is metamer of the given compound (X) ?



- (1)   
 (2)   
 (3)   
 (4) 

Ans. (4)

 65. DNA molecule contains 4 bases whose structure are shown below. One of the structure is not correct, identify the **incorrect** base structure.


Ans. (3)



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66. Match List I with List II :

| LIST I<br>(Hybridization) |           | LIST II<br>(Orientation in Space) |                      |
|---------------------------|-----------|-----------------------------------|----------------------|
| A.                        | $sp^3$    | I.                                | Trigonal bipyramidal |
| B.                        | $dsp^2$   | II.                               | Octahedral           |
| C.                        | $sp^3d$   | III.                              | Tetrahedral          |
| D.                        | $sp^3d^2$ | IV.                               | Square planar        |

Choose the **correct** answer from the options given below :

- (1) A-III, B-I, C-IV, D-II
- (2) A-II, B-I, C-IV, D-III
- (3) A-IV, B-III, C-I, D-II
- (4) A-III, B-IV, C-I, D-II

**Ans. (4)**

67. Given below are two statements :

**Statement I** : Gallium is used in the manufacturing of thermometers.

**Statement II** : A thermometer containing gallium is useful for measuring the freezing point (256 K) of brine solution.

In the light of the above statement, choose the correct answer from the options given below :

- (1) Both Statement I and Statement II are false.
- (2) Statement I is false but Statement II is true.
- (3) Both Statement I and Statement II are true.
- (4) Statement I is true but Statement II is false.

**Ans. (4)**

68. Which of the following statements are correct ?

- Glycerol is purified by vacuum distillation because it decomposes at its normal boiling point.
- Aniline can be purified by steam distillation as aniline is miscible in water.
- Ethanol can be separated from ethanol water mixture by azeotropic distillation because it forms azeotrope.
- An organic compound is pure, if mixed M.P. is remained same.

Choose the **most appropriate** answer from the options given below :

- (1) A, B, C only
- (2) A, C, D only
- (3) B, C, D only
- (4) A, B, D only

**Ans. (2)**

69. Match List I with List II :

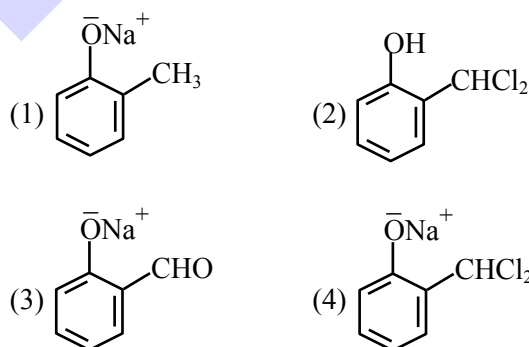
| LIST I<br>(Compound / Species) |           | LIST II<br>(Shape / Geometry) |              |
|--------------------------------|-----------|-------------------------------|--------------|
| A.                             | $SF_4$    | I.                            | Tetrahedral  |
| B.                             | $BrF_3$   | II.                           | Pyramidal    |
| C.                             | $BrO_3^-$ | III.                          | See saw      |
| D.                             | $NH_4^+$  | IV.                           | Bent T-shape |

Choose the **correct** answer from the options given below :

- (1) A-II, B-III, C-I, D-IV
- (2) A-III, B-IV, C-II, D-I
- (3) A-II, B-IV, C-III, D-I
- (4) A-III, B-II, C-IV, D-I

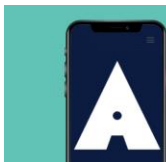
**Ans. (2)**

70. In Reimer - Tiemann reaction, phenol is converted into salicylaldehyde through an intermediate. The structure of intermediate is \_\_\_\_\_.


**Ans. (4)**

71. Which of the following material is not a semiconductor.

- (1) Germanium
- (2) Graphite
- (3) Silicon
- (4) Copper oxide

**Ans. (2)**


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72. Consider the following complexes.  
 $[\text{CoCl}(\text{NH}_3)_5]^{2+}$ ,  $[\text{Co}(\text{CN})_6]^{3-}$   
 (A) (B)  
 $[\text{Co}(\text{NH}_3)_5(\text{H}_2\text{O})]^{3+}$ ,  $[\text{Cu}(\text{H}_2\text{O})_4]^{2+}$   
 (C) (D)  
 The correct order of A, B, C and D in terms of wavenumber of light absorbed is :  
 (1)  $C < D < A < B$  (2)  $D < A < C < B$   
 (3)  $A < C < B < D$  (4)  $B < C < A < D$

Ans. (2)

73. Match List I with List II :

| LIST I<br>(Precipitating reagent and conditions) |  | LIST II<br>(Cation) |                  |
|--|--|---------------------|------------------|
| A.   | $\text{NH}_4\text{Cl} + \text{NH}_4\text{OH}$                          | I.                  | $\text{Mn}^{2+}$ |
| B.   | $\text{NH}_4\text{OH} + \text{Na}_2\text{CO}_3$                        | II.                 | $\text{Pb}^{2+}$ |
| C.   | $\text{NH}_4\text{OH} + \text{NH}_4\text{Cl} + \text{H}_2\text{S}$ gas | III.                | $\text{Al}^{3+}$ |
| D.   | dilute HCl   | IV.                 | $\text{Sr}^{2+}$ |

Choose the correct answer from the options given below :

- (1) A-IV, B-III, C-II, D-I  
 (2) A-IV, B-III, C-I, D-II  
 (3) A-III, B-IV, C-I, D-II  
 (4) A-III, B-IV, C-II, D-I

Ans. (3)

74. The electron affinity value are negative for :

- A.  $\text{Be} \rightarrow \text{Be}^-$   
 B.  $\text{N} \rightarrow \text{N}^-$   
 C.  $\text{O} \rightarrow \text{O}^{2-}$   
 D.  $\text{Na} \rightarrow \text{Na}^-$   
 E.  $\text{Al} \rightarrow \text{Al}^-$

Choose the most appropriate answer from the options given below :

- (1) D and E only (2) A, B, D and E only  
 (3) A and D only (4) A, B and C only

Allen Ans. (4)

NTA Ans. (1)

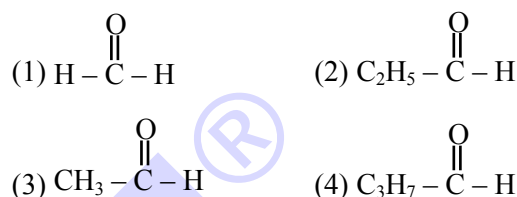
75. The number of element from the following that do not belong to lanthanoids is :  
 Eu, Cm, Er, Tb, Yb and Lu  
 (1) 3 (2) 4  
 (3) 1 (4) 5

Ans. (3)

76. The density of 'x' M solution ('x' molar) of NaOH is  $1.12 \text{ g mL}^{-1}$ . while in molality, the concentration of the solution is 3 m (3 molal). Then x is  
 (Given : Molar mass of NaOH is  $40 \text{ g/mol}$ )  
 (1) 3.5 (2) 3.0  
 (3) 3.8 (4) 2.8

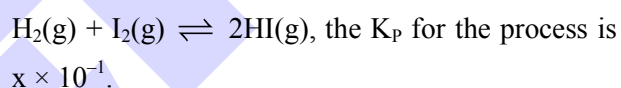
Ans. (2)

77. Which among the following aldehydes is most reactive towards nucleophilic addition reactions?



Ans. (1)

78. At  $-20^\circ\text{C}$  and 1 atm pressure, a cylinder is filled with equal number of  $\text{H}_2$ ,  $\text{I}_2$  and HI molecules for the reaction



$x = \underline{\hspace{2cm}}$ .

[Given :  $R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$ ]

- (1) 2 (2) 1  
 (3) 10 (4) 0.01

Ans. (3)

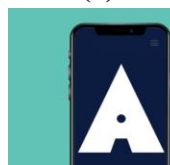
79. Match List I with List II :

| LIST I<br>(Compound) |                      | LIST II<br>(Uses) |                   |
|----------------------|----------------------|-------------------|-------------------|
| A.                   | Iodoform             | I.                | Fire extinguisher |
| B.                   | Carbon tetrachloride | II.               | Insecticide       |
| C.                   | CFC                  | III.              | Antiseptic        |
| D.                   | DDT                  | IV.               | Refrigerants      |

Choose the correct answer from the options given below :

- (1) A-I, B-II, C-III, D-IV  
 (2) A-III, B-II, C-IV, D-I  
 (3) A-III, B-I, C-IV, D-II  
 (4) A-II, B-IV, C-I, D-III

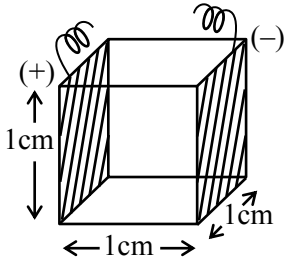
Ans. (3)



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80. A conductivity cell with two electrodes (dark side) are half filled with infinitely dilute aqueous solution of a weak electrolyte. If volume is doubled by adding more water at constant temperature, the molar conductivity of the cell will -

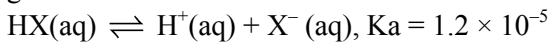


- (1) increase sharply  
(2) remain same or can not be measured accurately  
(3) decrease sharply  
(4) depend upon type of electrolyte

Ans. (2)

### SECTION-B

81. Consider the dissociation of the weak acid HX as given below



[ $K_a$  : dissociation constant]

The osmotic pressure of 0.03 M aqueous solution of HX at 300 K is  $\quad \times 10^{-2}$  bar (nearest integer).

[Given :  $R = 0.083 \text{ L bar Mol}^{-1} \text{ K}^{-1}$ ]

Ans. (76)

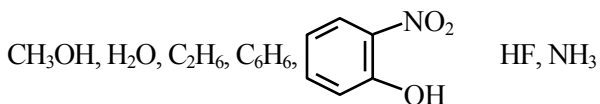
82. The difference in the 'spin-only' magnetic moment values of  $\text{KMnO}_4$  and the manganese product formed during titration of  $\text{KMnO}_4$  against oxalic acid in acidic medium is  $\quad$  BM. (nearest integer)

Ans. (6)

83. Time required for 99.9% completion of a first order reaction is  $\quad$  time the time required for completion of 90% reaction. (nearest integer).

Ans. (3)

84. Number of molecules from the following which can exhibit hydrogen bonding is  $\quad$ . (nearest integer)

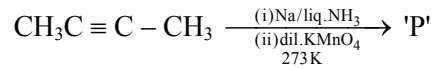


Ans. (5)

85. 9.3 g of pure aniline upon diazotisation followed by coupling with phenol gives an orange dye. The mass of orange dye produced (assume 100% yield/ conversion) is  $\quad$  g. (nearest integer)

Ans. (20)

86. The major product of the following reaction is P.



Number of oxygen atoms present in product 'P' is  $\quad$  (nearest integer).

Ans. (2)

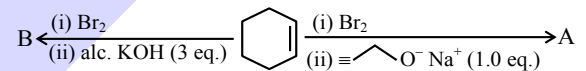
87. Frequency of the de-Broglie wave of electron in Bohr's first orbit of hydrogen atom is  $\quad \times 10^{13}$  Hz (nearest integer).

[Given :  $R_H$  (Rydberg constant) =  $2.18 \times 10^{-18} \text{ J}$ .  $h$  (Plank's constant) =  $6.6 \times 10^{-34} \text{ J.s}$ .]

Allen Ans. (656 to 660)

NTA Ans. (658)

88. The major products from the following reaction sequence are product A and product B.



The total sum of  $\pi$  electrons in product A and product B are  $\quad$  (nearest integer)

Ans. (8)

89. Among  $\text{CrO}$ ,  $\text{Cr}_2\text{O}_3$  and  $\text{CrO}_3$ , the sum of spin-only magnetic moment values of basic and amphoteric oxides is  $\quad 10^{-2}$  BM (nearest integer).

(Given atomic number of Cr is 24)

Ans. (877)

90. An ideal gas,  $\bar{C}_v = \frac{5}{2}R$ , is expanded adiabatically against a constant pressure of 1 atm until it doubles in volume. If the initial temperature and pressure is 298 K and 5 atm, respectively then the final temperature is  $\quad$  K (nearest integer).

[ $\bar{C}_v$  is the molar heat capacity at constant volume]

Ans. (274)



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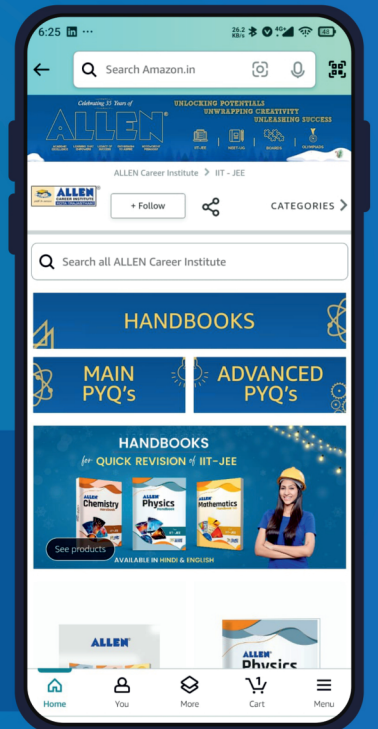
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