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BSc3CheC301x

Seat No : 860761

B.Sc. Semester - 3 (CBCS) Examination

Nov/Dec. -2021 [NEW COURSE]

Chemistry-C301(Core)

Time: 2:30 Hours

Marks: 70

**Instructions:**

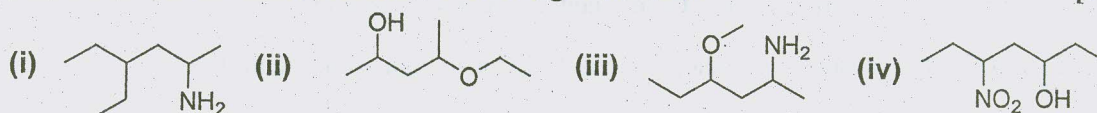
1. All questions are compulsory.
2. Figures to the right indicate marks.

**Q. 1 (A)** Prove that: Wave function  $\Psi = \sin kx$  is eigen function for operator  $\frac{d^2}{dx^2}$  but not for  $\frac{d}{dx}$  [04]

**Q. 1 (B)** Answer the following (Any Two) [10]

- (1) Determination of co-efficient for sp – hybridization & the bond angle between hybrid orbitals.
- (2) Write the equation of magnetic moment & calculate magnetic moment for  $Fe^{+2}$ ,  $Ni^{+2}$ ,  $Cr^{+3}$ ,  $Sc^{+3}$ .
- (3) Give the uses of lanthanides.

**Q. 2 (A)** Give the IUPAC name of each of following molecules. [04]



**Q. 2 (B)** Answer the following (Any Two) [10]

- (1) Discuss: Claisen rearrangement with mechanism and applications.
- (2) Give the synthesis of phenol; (a) Dow process; (b) Cumene process
- (3) Explain: primary, secondary and tertiary amine differentiate test.

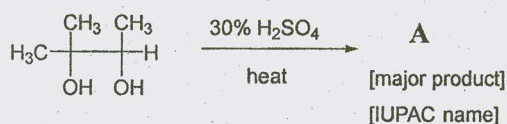
**Q. 3 (A)** Match the following pair: [04]

| Solute in Solvent |                  | Example |                                    |
|-------------------|------------------|---------|------------------------------------|
| 1                 | Gas in Gas       | a       | Mercury in Silver                  |
| 2                 | Liquid in Liquid | b       | Alcohol in Water                   |
| 3                 | Solid in Liquid  | c       | O <sub>2</sub> in H <sub>2</sub> O |
| 4                 | Liquid in Solid  | d       | O <sub>2</sub> in N <sub>2</sub>   |
|                   |                  | e       | Sugar in water                     |

**Q. 3 (B)** Answer the following (Any Two) [10]

- (1) Explain: Sulphur system by phase diagram.
- (2) State and explain Raoult's Law.
- (3) Give the statement, derivation and limitations of Nernst distribution law.

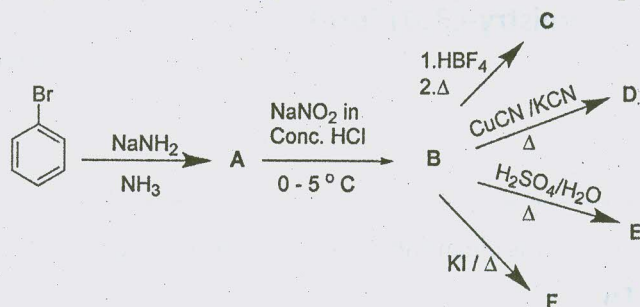
**Q. 4 (A)** Complete the following reactions & give the full mechanism. [04]



**Q. 4 (B) Answer the following (Any Two)**

[10]

(1) Complete the following reactions and write name of products A to F.



(2) Give any five postulates of wave mechanics.

(3) Explain: Ullmann reaction with any two applications.

**Q. 5 (A) Give the factors affecting on solubility.**

[04]

**Q. 5 (B) Answer the following (Any Two)**

[10]

(1) Define with example: Phase, Component & Degree of freedom.

(2) (a) Give the reason: Aliphatic amine is more basic than aromatic amine.

(b) Explain: Effect of substitution on acidity of phenol.

(3) A mixture of liquids A & B exhibits ideal behaviour. at  $90^\circ\text{C}$ , the total vapour pressure of a liquid solution containing 1.5 mol A and 2.5 mol B is 330 torr. Upon the addition of 1 more mol of B to the solution, the vapour pressure is 350 torr. Calculate the vapour pressure of pure A & pure B at  $90^\circ\text{C}$ .

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