

B.Sc. Semester - 3 (CBCS) Examination
Oct/Nov - 2023 [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) Answer the following question.** (04)
1) Derive the wave functions of H_2^+ molecule.
- B) Answer the following question. (Any two)** (10)
1) Derive wave functions and co-efficient of sp hybridization.
2) Derive potential energy and Schrodinger's wave equation for H_2 molecule.
3) Discuss colour properties of Lanthanide ions.
- Q-2** **A) Answer the following question.** (04)
1) Discuss the test by which primary, secondary and tertiary amine can be distinguished.
- B) Answer the following questions. (Any two)** (10)
1) Write conversion: **(I)** p-Nitroaniline from aniline
 (II) Methyl orange from sulphanilic acid.
2) Explain Williamson ether synthesis with suitable examples.
3) Draw structure of product(s) and write its name in the following reactions when
 a) Phenol is heated with chloroform and aq. NaOH solution
 b) Methanamine is heated with chloroform and aq. NaOH solution
 c) Sodium salicylate is treated with dil HCl solution.
 d) Pentane-2,3-diol is treated with HIO_4 .
 e) Phenyl acetate is heated with anhydrous $AlCl_3$.
- Q-3** **A) Answer the following question.** (04)
1) Vapour pressure of pure toluene is 400 torr and that of pure o-xylene is 150 torr at $90^\circ C$. Determine the composition of the liquid and vapour phases if toluene and o-xylene are mixed at $90^\circ C$ and total pressure of 0.5 atm (Assuming the ideal solution behavior).
- B) Answer the following questions. (Any two)** (10)
1) Difference between positive deviation and negative deviation from Raoult's law.
2) Describe the phase diagram of incongruent melting point system.
3) Derive Nernst equation when solute associate and dissociate in the solvent.
- Q-4** **A) Answer the following question.** (04)
1) Write note on Misch metal.
- B) Answer the following questions. (Any two)** (10)
1) Discuss lanthanide contraction in detail.
2) Discuss effect of substituent on acidity of phenol by giving suitable resonating structure.
3) Discuss phase diagram of water system.
- Q-5** **A) Answer the following question.** (04)
1) Compare SN^2 and SN^1 reactivity of vinyl halide and allyl halide towards nucleophilic substitution reaction.
- B) Answer the following questions. (Any two)** (10)
1) Discuss magnetic properties of 3-d transition series elements.
2) How benzene diazonium salt is prepared? Prepare phenol, benzene, fluorobenzene and benzoic acid from benzene diazonium chloride using suitable reagents.
3) Explain Henry's law with its limitation.
