

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)

CLASS: IMSC  
BRANCH: PHYSICS

SEMESTER : III  
SESSION : MO/2022

SUBJECT: CH213 GENERAL CHEMISTRY II

TIME: 3:00 Hours

FULL MARKS: 50

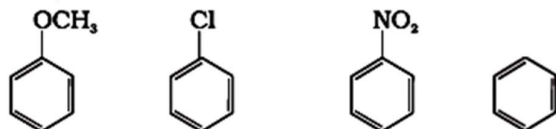
INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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- Q.1(a) Define vapour pressure. How is it measured? Explain temperature effect on vapour pressure. [2]  
Q.1(b) Derive and explain law of corresponding states. [3]  
Q.1(c) Discuss the Vanderwall's equation based on the following conditions: (i) When the pressure is not too high (ii) When the pressure is too high (iii) When the temperature is high. [5]

- Q.2(a) Metal-Ligand bond formation is nothing but Lewis acid-Lewis base reactions. Elaborate. [2]  
Q.2(b) Describe the mechanism of action of 'acidic' and 'basic' buffer. Give example in each case. [3]  
Q.2(c) What do you mean by 'Solubility product' of a salt? If  $K_{sp}$  of  $\text{CaF}_2$  is  $3 \times 10^{-11}$ , then what will be the concentration of calcium and fluoride ions in a saturated solution of  $\text{CaF}_2$ ? All measurements are at  $25^\circ\text{C}$ . [5]

- Q.3(a) 'The cyclopentadienyl cation is unstable but cyclopentadienyl anion is stable'- explain the statement. [2]  
Q.3(b) Arrange the following set of compounds in the order of their decreasing relative reactivity towards electrophilic substitution. Give reason. [3]



- Q.3(c) Write short note on Friedel Craft acylation reaction. Friedel Craft acylation and then reduction is better than alkylation for the synthesis of long chain alkyl substitution- explain the statement. [5]

- Q.4(a) Describe the salient features of 'Quinhydrone electrode'. [2]  
Q.4(b) Describe the salient features of a 'Lithium-ion'battery. Highlight the charging-discharging chemistry involved. [3]  
Q.4(c) What are the preconditions for potentiometric titration and enumerate its types. Show graphically the different curves for equivalence point for acid base titration. Why potentiometric titration is needed? [5]

- Q.5(a) Write short note on Free radical substitutions in alkane. [2]  
Q.5(b) Wurtz reaction gives good yields only for "even carbon" alkane- explain statement with the help of proper mechanism. [3]  
Q.5(c) Discuss details about E2 mechanism of elimination. Comment on the stereochemistry of the process. Write short note on Wittig reaction. [5]

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