

**End-Term Examination
Odd-Semester, 2018-19**

Program: B.Tech.

Subject with Code: Engg. Chemistry,

Time: 3 Hour

Year: 1st

BCHC0101

Maximum Marks: 50

Section A

Attempt all questions

[5x7=35 marks]

Ques 1.

[3+2]

- (i) Draw the molecular orbital diagram of N_2 , find out bond order and also assign magnetic behavior.
- (ii) Differentiate enantiomers and diastereomers.

Ques 2.

[3+2]

- (i) How experimentally calorific value of a fuel is determined by bomb calorimeter? Explain with neat diagram.
- (ii) Calculate the volume of air required for complete combustion of 20 litres of propane (C_3H_8).

Ques 3.

[3+2]

- (i) With the help of suitable diagram discuss reverse osmosis or ion exchange process for the treatment of hard water.
- (ii) What do you mean by smart Materials? Give any two examples of smart Materials.

Ques 4.

[3+2]

- (i) Discuss the mechanism of thick film lubrication. Give two examples of solid lubricants.
- (ii) In a polymer sample, 20% molecules have molecular mass 15,000, 45% have molecular mass 30,000 and rest have 40,000. Calculate number average and mass average molecular mass of polymer sample.

Ques 5.

[2+1+2]

- (i) If in first order reaction time taken for the completion of 35% of the reaction is 15 min. calculate the time for completion of 70% of the reaction.
- (ii) Write important industrial applications of ceramics.
- (iii) Discuss the implications of corrosion on global economy.

Ques 6.

[3+2]

- (i) With reference to UV-Visible spectroscopy, discuss different types of electronic transitions (with examples) for organic molecules.
- (ii) Define annealing. Why it is required during the manufacturing of glass.

Ques 7.

[3+2]

- (i) Outline the different methods used for the protection of metal from corrosion.
- (ii) The hardness of 1 litre of water was removed by a zeolite softener which needed 117 mg NaCl for regeneration, calculate hardness of water sample.

Section B**Attempt all questions****Ques 1.**

[3x2 = 6 marks]

- (i) Calculate total number of fundamental vibrations, stretching vibrations and bending vibrations for CO_2 and phenol.
- (ii) Calculate pH of one litre of solution containing 0.2M NH_2OH and 0.25 M NH_2Cl solution. K_b for NH_2OH is 1.8×10^{-5} .
- (iii) What are nanomaterials? Define quantum dot and graphene.

Ques 2.

[3x3 = 9 marks]

- (i) What is corrosion? Discuss the theory of electrochemical corrosion with absorption of oxygen.
- (ii) Derive second order rate equation when concentration of both the reactants is same and also show that time taken for half completion of this reaction is inversely proportional to the initial concentration of the reactant.
- (iii) Discuss the theory of NMR spectroscopy. How many proton NMR signals will you get for Toluene and $\text{CH}_2=\text{CHCH}_3$.