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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (2011 Onwards) (Sem.–1,2) ENGINEERING CHEMISTRY Subject Code : BTCH-101 Paper ID : [A1106]

Time: 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION B &C. have FOUR questions each.
- 3. Attempt any FIVE questions from SECTION B& C carrying EIGHT marks each.
- 4. Select atleast TWO questions from SECTION B &C.

SECTION - A

- 1. Write briefly :
 - (a) Calculate the number of vibrational degrees of freedom in CO_2 and SO_2 .
 - (b) Distinguish between photo physical and photochemical process.
 - (c) What are Optical Sensors?
 - (d) Differentiate between Scale and Sludge.
 - (e) What do you mean by Anodic Sacrificial Protection?
 - (f) CO_2 should not be present in boiler feed water. Why?
 - (g) What are atactic polymers?
 - (h) Which of the following will exhibit infrared spectra and why? N₂, HCl, O₂, CO₂.
 - (i) What are Reinforced Composite Materials?
 - (j) What are Coercing Colloids?

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SECTION - B

- 2. (a) State and explain Franck-Condon principle.
 - (b) Why butadiene shows absorption at higher wavelength than ethene? Give suitable energy level diagram.
- 3. (a) Draw a well labelled Jablonski diagram and explain the terms involved in it.
 - (b) Define quantum yield. What are the reasons for low and high quantum yield?
- 4. (a) Discuss the methods of disinfection of water.
 - (b) Calculate the amount of lime and soda required to soften 50,000 litres of water having following analysis:

 $Ca(HCO_3)_2 = 8.1 \text{ mg};$ $Mg(HCO_3)_2 = 5.0 \text{ mg};$ $CaSO_4 = 13.6 \text{ mg};$ $MgCl_2 = 2.0 \text{ mg};$ $MgSO_4 = 12.0 \text{ mg};$ NaCl = 4.7 mg.

- 5. (a) What do you mean by green chemistry? Briefly explain atom economy.
 - (b) What are advantages of using ionic liquids in organic reactions?

SECTION - C

- 6. (a) What is Corrosion? Discuss the factors affecting corrosion.
 - (b) Explain the following types of corrosion :
 - (i) Waterline corrosion
 - (ii) Stress corrosion
- 7. (a) What is Polymerization? Discuss various types of polymerization.
 - (b) In a polymer, there are 100 molecules of molecular weight 100, 200 molecules of molecular weight 1000 and 300 molecules of molecular weight 10,000. Find M_n and M_w .
- 8. (a) Discuss two dimensional assembly and mesoscale assembly.
 - (b) Explain super molecular structures.
- 9. (a) Discuss third generations petrochemicals by giving suitable examples.
 - (b) What is crude oil? Give composition and classification of crude oil.