B.Tech. (2012 to 2017)   (Sem.–1,2)
ENGINEERING CHEMISTRY
Subject Code : BTCH-101
M.Code : 54093

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS 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 Each.**

SECTION-A

Answer briefly :

1. How many signals would you expect to see in the ^{1}H NMR spectrum of the following :

    $CH_3CH_2CH_2OH_3$ [benzene ring with OCH_3 and OCH_3 substituents]
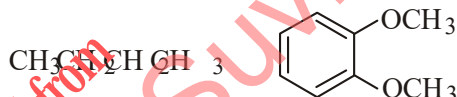
2. How are salts responsible for the temporary and permanent hardness of water? Explain.

3. State Beer-Lambert Law.

4. What are concentration cells?

5. State the law of photochemical equivalence.

6. Define Atom Economy.

7. Why does $Mg(HCO_3)_2$ require double amount of lime for softening?

8. Define Molecular self Assembly.

9. What is the importance of finger print region in IR spectroscopy?

10. "*Iron does not rust when zinc coating is broken in a galvanized iron pipe but rusting occurs if a coating of tin over iron is broken*". Why?

SECTION-B

11. a) Explain any two principle's of Green Chemistry with the help of examples. (5)

 b) Elaborate the statement -"*Microwave heating as a Greener Technology*". (3)

12. a) Calculate the amount of lime (84% pure) and Soda (92% pure) required for treatment of 20,000 liters of water, whose analysis is as follows $Ca(HCO_3)_2$ = 40.5 ppm; $Mg(HCO_3)_2$ = 36.5 ppm: $MgSO_4$ = 30.00 ppm: $CaSO_4$ = 34.0 ppm: $CaCl_2$ = 27.75 ppm and NaCl = 10.00 ppm. Also calculate the temporary and permanent hardness of water. (4)

 b) What are lime and soda processes? Compare hot and cold soda lime process for softening of hard water. (4)

13. a) How do you distinguish between different types of transitions involved in UV-Vis spectroscopy? (4)

 b) How many NMR signals are observed in the spectrum of : (4)

 i) CH_3COOCH_3

 ii) $CH_3\text{-}CH_2\text{-}CH_2CH_3$

 iii) CH_3OCH_3

 iv) $CH_3CH_2CN_3$

14. a) Draw a well labelled Jablonski diagram and explain :

 i) Intersystem crossing (2)

 ii) Phosphorescence (2)

 iii) Fluorescence (2)

 b) A solution shows a transmittance of 20% when taken in a cell of 2.5 cm thickness. Calculate its concentration, if the molar absorption coefficient is 12,000 $dm^3mol^{-1}\ cm^{-1}$. (2)

SECTION-C

15. a) Explain the mechanism of following types of corrosion :

    i) Galvanic corrosion   (2)

    ii) Wet corrosion   (2)

    b) What are the various methods that needs to be followed to control corrosion? (4)

16. a) What are different type of polymerization reactions? Give examples. (4)

    b) How does molecular weight affect the properties of polymer? (4)

17. Write a short note on **any two** of the following :   (4×2=8)

    a) Classification of crude oil

    b) Properties of natural gas

    c) Raw material for petrochemicals

18. a) What are self assembling materials? Also discuss mesoscale self assembly. (4)

    b) Discuss the potential applications of nanomaterial in coming future. (4)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.