Roll No. .....

TCH–101

B. TECH. (FIRST SEMESTER)
END SEMESTER EXAMINATION, 2019

(All Branches)

ENGINEERING CHEMISTRY

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks for each main question are **twenty**.

1. Attempt any *two* parts of choice from (a), (b) and (c). (2×10=20 Marks)

   (a) Enumerate the difference between S_N1 and S_N2 reactions. Illustrate the stereochemical implication of S_N1 and S_N2 reactions with respect to ter-butyl bromide. [CO6]

   (b) Draw the structure of paracetamol and aspirin and mention *two* applications of each. [CO6]

   (c) Explain the structure of SO_2 and XeF_4 with the help of VSEPR theory. [CO1]

2. Attempt any *two* parts of choice from (a), (b) and (c). (2×10=20 Marks)

   (a) Write short notes on the following : [CO3]

   (i) PMMA

   (ii) Nylon-6, 6

   (b) Enumerate the difference between thermoplastics and thermosetting resins with suitable examples. [CO3]

(c) Discuss the principle of UV-Vis spectroscopy and the various types of electronic transitions involved in this spectroscopy. [CO4]

3. Attempt any *two* parts of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Write the applications of the following : [CO5]

(i) Electrochemical series

(ii) Nernst equation

(b) Calculate the standard EMF of the following cell at 25°C; writing its half cell reaction and net cell reaction :

$$Zn|ZnSO_4||\ CuSO_4|Cu.$$

Standard potentials of Cu and Zn electrodes are + 0.34 and – 0.76 V respectively. [CO5]

(c) Explain the mechanism of free radical addition polymerization reaction. [CO3]

4. Attempt any *two* parts of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Differentiate between temporary and permanent hardness. 100 mL of a water sample has a hardness equivalent of 12 mL of 0.08 N $MgSO_4$. What is its hardness in ppm ? [CO2]

(b) Give the principle of ion exchange process for water softening. [CO2]

(c) Differentiate between Galvanic Cell and Electrolytic Cell with suitable examples. [CO5]

5. Attempt any *two* parts of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Give the principle of NMR spectroscopy. Predict the number of signals and singlets in the NMR spectrum of : [CO4]

(i) $CH_3 - CH_2 - OH$

(ii) $CH_2 - Cl - CH_2 - Cl$

(iii) $CH_3 - CH_2 - CH_3$

(b) Define the corrosion of metals and differentiate between dry and wet corrosion. [CO5]

(c) State the basic principle of IR spectroscopy. Describe the various molecular vibrations in this technique. [CO4]