18/12/18
9.30-1230

H Roll No. .....

TCH–101

B. TECH. (FIRST SEMESTER)
END SEMESTER EXAMINATION, 2018
(ALL BRANCHES)
ENGINEERING CHEMISTRY

Time : Three Hours

Maximum Marks : 100

Note : (i) This question paper contains *five* questions.

(ii) All questions are compulsory.

(iii) Each question carries three parts (a), (b) and (c). Attempt any *two* parts from each question.

(iv) Each part carries **ten** marks. Total marks assigned to each question are **twenty**.

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

(a) (i) Write the main postulates of VSEPR theory with the discussion of geometry of NH_3 and H_2O molecule.

(ii) Write the main postulates of Electron sea theory, to explain metallic bonding.

(b) Write a note on Hydrogen bonding. Also write the conditions for its formation and significances.

(c) On the basis of MOT diagram, explai. why O_2 molecule is paramagnetic in nature.

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

(a) Write briefly about reaction intermediates. Write about the stability of Carboanions.

(b) (i) Write the mechanism of S_{N1} and S_{N2} reactions.

(ii) Write a short note on Electrophilic substitution reactions.

(c) (i) Write a short note on Inductive effect, with the help of suitable examples.

(ii) Differentiate between Electrophiles and Nucleophiles.

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

(a) Write short notes on the following :

(i) Functionality of Monomer

(ii) Conducting Polymers

(b) Define addition and condensation polymerization with suitable examples and mechanism.

(c) Write the preparation, properties and uses of (i) Bakelite and (ii) PMMA.

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

(a) Write short notes on the following :

(i) Activation Energy

(ii) Concentration cells

(b) (i) Derive the derivation of Nernst equation for the calculation of EMF of half cell.

(ii) For a first order reaction, the rate constant found to be 7×10^{-7} at 27°C and 9×10^{-4} at 87°C. Calculate the activation energy of the reaction. (log7 = 0.8451, log 9 = 0.9542).

(c) Prove that for second order reaction, the half life period is inversely proportional to initial concentration of one of reactant (when the reactants are same).

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

(a) Write short notes on the following :

(i) Zeolite process for softening of water

(ii) Calorific value of a fuel.

(b) (i) Write a short note on Biogas.

(ii) Write the principle and applications of IR spectroscopy.

(c) Define the terms Gross and Net Calorific value of a fuel. A coal sample, tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained :

Weight of coal burnt = 0.95 gm,

Weight of water taken = 500 gm,

Weight of water equivalent of bomb and calorimeter = 2000 gm,

Rise in temperature = 2.48°C,

Cooling correction = 0.02°C,

Fuse wire correction = 10 Cal,

Acid correction = 60 cal.

Calculate the GCV and NCV of the coal in cal/gm. Given latent heat of Condensation of steam is 580 cal/gm.