

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. I Year I - Semester (Supplementary) Examinations, July/Aug - 2015

Engineering Chemistry - I

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE questions from Part-B

Part-A (10 X 2=20 Marks)

- 1 Calculate the hardness of a water sample when 20 ml of it consumed 15 ml of 0.02 N EDTA Solution.
- 2 Draw a neatly labeled diagram for break point chlorination. Write its advantages.
- 3 What is meant by degree of polymerization? Explain with an example
- 4 Interpret functionality of a monomer on the structure of a polymer.
- 5 Categorize conducting polymers and write an example of each.
- 6 What are the limitations in Glass-Fiber Reinforced Composites?
- 7 Calculate the efficiency and work of a heat engine drawing 500 calories of heat from a reservoir and rejecting 200 calories to the sink.
- 8 Differentiate isothermal and adiabatic processes.
- 9 Give the condition when $GCV = NCV$.
- 10 Why does the petrol air mixture expand on ignition?

Part-B (Marks: 50)

- 11 a) Explain the principle and applications of Reverse Osmosis method. (5)
- b) A sample of water contains the following salts in mg/lit.
 $Ca(HCO_3)_2 = 48.6$, $Mg(HCO_3)_2 = 292$, $MgSO_4 = 30$, $CaSO_4 = 27.2$, $MgCl_2 = 55.5$
and $NaCl = 58.5$ (5)
Calculate carbonate, non-carbonate and total hardness of water sample.
- 12 a) Compare addition and condensation polymerization with examples. (5)
- b) Substantiate the need of vulcanization? Explain the chemistry of vulcanization (5)
- 13 a) Illustrate the mechanism of conduction in doped polyacetylene. Write the applications of conducting polymers. (5)
- b) Explain the characteristics and classification of Reinforced composites. (5)
- 14 a) Construct Carnot's heat engine and prove that the efficiency of a heat engine is always less than unity. (7)
- b) Predict the spontaneity of a reaction at $120^{\circ}C$ for which the heat of reaction at constant pressure is 25 K.Joules and entropy change is 55 Joules/k. (3)
- 15 a) Analyze the significance of proximate analysis of coal. (4)
- b) Calculate gross and net calorific value of a sample of coal having the following composition. C = 70 %, H = 8 %, O = 5 %, S = 4 %, N = 8 % and remaining is ash. (4)
- c) What is cracking and substantiate its need? (2)
- 16 a) What is the significance of octane number and cetane number and for which these are used? How these can be improved? (6)
- b) Explain the variation of free energy with temperature and pressure and derive Gibbs-Helmholtz equation. (4)
- 17 a) Explain the determination of hardness of water by complex metric titration method? (6)
- b) Thermoplastics can be recycled but thermosetting resins cannot be. Justify. (4)
