

VASAVI COLLEGE OF ENGINEERING (*Autonomous*) HYDERABAD
B.E. I/IV (All Branches) I-Semester(Main) Examinations, Feb.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 (Marks: 20)

- 1 Calculate and identify the type of hardness of 1 liter of water sample containing 30 mg of $MgSO_4$ in it .
- 2 Write the ill effects of $CaSO_4$ in boiler feed water. Suggest one method for its control.
- 3 What is vulcanization? List any two vulcanizing agents.
- 4 What are the repeating units in Kevlar and PVC?
- 5 Define extrinsic polymers? Explain with an example.
- 6 Discuss the characteristics of Reinforced composites.
- 7 Show that entropy of universe is constantly increasing.
- 8 Compute the heat to be drawn from a reservoir when a heat engine is working between the temperatures $200^\circ C$ and $100^\circ C$ and work done is 350 Joules.
- 9 Classify the chemical fuels and give examples of each.
- 10 Why is net calorific value less than gross calorific value?

Part-B (Marks: 50)

- 11 a) What is alkalinity? Discuss its experimental determination. (6)
- b) 100 ml of standard hard water containing 1 mg of pure $CaCO_3$ per ml, consumed 50 ml of EDTA. 50 ml of hard water sample consumed 25 ml of the same EDTA solution. After boiling, cooling and filtering 50 ml of the same hard water sample consumed 10 ml of EDTA solution. Calculate the temporary, permanent and total hardness of water sample in ppm. (4)
- 12 a) Differentiate thermo softening and thermo setting resins (4)
- b) Write the chemical equations for the preparation of Buna-S and Silicone rubbers. (3)
- c) What are biodegradable polymers? Explain their advantages. (3)
- 13 a) Illustrate the mechanism of conduction in doped polyacetylene. (5)
- b) Discuss a detailed account of fiber reinforced composites. (5)
- 14 a) Derive Gibbs-Helmholtz equation. Write its applications. (6)
- b) Calculate ΔG , Q , W , and ΔE for isothermal reversible expansion of 2 moles of an ideal gas at $27^\circ C$ from a volume of 10 dm^3 to 20 dm^3 . (4)
- 15 a) Suggest and discuss a method for conversion of heavy oil into petrol. (5)
- b) How are catalytic converters useful in reducing the toxicity of exhaust emissions? (2)
- c) Compute the higher and lower calorific values of a coal sample containing 80% carbon, 3 % sulphur, 8 % hydrogen, 6 % oxygen and 3 % nitrogen. (3)
- 16 a) How quality of a gasoline is is assessed and enhanced? Explain. (5)
- b) State 2nd Law of thermodynamics and discuss the criteria spontaneity in terms of free energy. (5)
- 17 a) Describe the preparation, properties and uses of Bakelite. (4)
- b) Distinguish scale and sludge and appraise their causes and prevention. (6)