



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, B.E. - Semester End Examination; June - 2017

Engineering Chemistry

(Common to all Branches)

Time: 3 hrs

Max. Marks: 100

- Note:** i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.
ii) Assume suitably missing data if required.

UNIT - I

- 1 a. Define GCV and NCV. Explain the determination of calorific value of gaseous fuel using Boy's calorimeter. 8
- b. Explain the concept and mechanism of knocking in IC engine. 6
- c. Define reformation of petrol. Explain the reactions involved in the process. 6
- 2 a. How is gasoline manufactured by fluidized bed catalytic cracking? 6
- b. State Gibb's phase rule and explain the terms involved in it with suitable example. 7
- c. Discuss the application of phase rule to a single component system with a labeled diagram. 7

UNIT - II

- 3 a. Define standard electrode potential. Derive the Nernst's equation for electrode potential. 5
- b. Write the electrode reactions for the following cell and calculate its emf at 25°C,
 $Z_n \mid Z_n^{2+} (0.1M) \parallel A_g^+ (1.0M) \mid A_g$ 5
- Given: $E_{A_g}^0 = 0.8 V$ and $E_{Z_n}^0 = -0.76 V$ at 25°C.
- c. Explain the classification of batteries with examples. 4
- d. Give the construction and working of Ni-metal hydride battery. 6
- 4 a. Describe the following characteristics of a battery : 8
- i) Capacity ii) Voltage
- iii) Energy efficiency iv) Shelf life.
- b. Give the construction, working and applications of Z_n -air battery. 6
- c. Distinguish between batteries and a fuel cell. Explain the construction and working of H_2 - O_2 fuel cell. 6

UNIT - III

- 5 a. Describe electrochemical theory of corrosion by taking iron as an example. 6
- b. Discuss the effect of the following factors on the rate of corrosion : 6
- i) Nature of the metal ii) Nature of the corrosion product iii) Temperature.
- c. Explain corrosion control by cathodic protection. 8

- 6 a. Write a note on corrosion inhibitors. 6
- b. Mention the technological importance of metal finishing. Explain electroless plating of Cu on PCB. 8
- c. Explain the effect of the organic additives on the nature of electro deposit. 6

UNIT - IV

- 7 a. Describe the following properties of a lubricant : 6
- i) Volatility ii) Pour point iii) Cloud point.
- b. Give the synthesis and applications of polyurethane and Butyl rubber. 6
- c. Explain the synthesis, properties and applications of ureaformaldehyde formaldehyde resins. 8
- Mention the disadvantages of plastics.
- 8 a. Write a note on compounding of rubber. 6
- b. Give the synthesis and applications of conducting polyaniline. 6
- c. Explain the following properties of cement : 8
- i) Shrinkage ii) Setting Time
- iii) Soundness iv) Quality.

UNIT - V

- 9 a. What are the boiler scales? How are they formed? Explain their ill effects. 8
- b. Define COD and BOD. Compute COD of 25 ml of an effluent which consumes 15.0 ml of 0.025 M $K_2Cr_2O_7$ for complete oxidation. 6
- c. Explain the sewage treatments of water. 6
- 10 a. Discuss the types of mesophases in liquid crystals. 8
- b. Explain the prevention of boiler scales by internal methods. 6
- c. What is desalination? Explain the desalination of water by electro dialysis. 6

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