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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
I/II Sem, B.E. - Semester End Examination; May/June - 2018
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 any.

UNIT - I

1 a. Elaborate on the experimental determination of calorific value of a solid fuel using Bomb calorimeter.   7

  b. Justify the need of reformation of petrol. Write any three reactions during reformation.   7

  c. With the help of phase diagram of Pb-Ag system, explain desilverisation of lead by Pattinson's process.   6

2 a. Explain the fluidized bed catalytic cracking. Mention its advantages.   7

  b. Explain the Phase diagram of water system.   7

  c. Define Phase rule. Explain the terms involved.   6

UNIT - II

3 a. Derive Nernst equation for electrode potential.   6

  b. What are ion-selective electrodes? Explain the determination of pH of a solution using glass electrode and mention its advantages.   8

  c. Describe the construction and working of Nickel-Metal hydride battery.   6

4 a. Explain the construction and working of calomel electrode.   6

  b. An electrochemical cell is constructed by placing Ni electrode in 0.01 M, Ni^{2+} solution and Pb electrode in 0.5M Pb^{2+} solution. The SRP of Ni and Pb are - 0.24 V and - 0.13 V respectively. Write the cell representation, cell reactions and calculate the emf of the cell.   6

  c. Discuss the construction and working of Lithium ion battery with reactions involved during discharge.   4

  d. Explain the following characteristics of a battery :
   i) Energy efficiency   ii) Capacity   4

UNIT - III

5 a. Define Corrosion and explain the Corrosion of iron based on electrochemical theory.   7

  b. Discuss the effect of :
   i) Area of cathode to anode
   ii) Nature of corrosion product
   iii) pH on the rate of corrosion   6

c. What is electroless plating? Discuss electroless plating of copper for PCB. 7

6 a. What is Cathodic Protection? Explain sacrificial anode method. 6

b. Explain electroplating of chromium by sulphate method. 7

c. Outline the process of Galvanizing and tinning. 7

UNIT - IV

7 a. Define Tg. Explain any three factors that influence Tg of a polymer. 8

b. What is meant by vulcanization? Explain the changes that occur upon vulcanization in elastomers. 6

c. Discuss the following properties of cement :

i) Quality

ii) Soundness 6

iii) Shrinkage

8 a. Explain the following properties of lubricants :

i) Flash point   ii) Viscosity index 8

iii) Cloud point   iv) Coke point

b. Write reactions of preparation of epoxy resin. Mention its applications. 6

c. Give the synthesis and applications of :

i) Poly carbonate 6

ii) Butyl rubber

UNIT - V

9 a. What are Liquid crystals? Distinguish between Thermo-Tropic and Lyo-Tropic liquid crystals with examples. Mention its applications. 7

b. What is the significance of measurement of COD? Explain the determination of COD in the laboratory. 6

c. What are nanoparticles? Mention any two properties of them and their applications. 7

10 a. Explain desalination by reverse osmosis with principle. Mention two advantages of RO process. 7

b. What are boiler scales? Discuss their formation and ill effect. 7

c. Define COD and BOD. Calculate the COD of effluent sample, when 25 ml of an effluent requires 8.9 ml of 0.02M $K_2Cr_2O_7$ for complete oxidation. 6

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