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

(An Autonomous Institution affiliated to VTU, Belgaum)

Second Semester, B.E. - Semester End Examination; June - 2016

Engineering Chemistry

(Common to all Branches)

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. What is cracking? Explain the process of fluidized bed catalytic cracking. 7

b. What is knocking? Mention the ill-effects of knocking. How knocking of gasoline is reduced by adding anti knocking agents? 7

c. Draw a neat labeled phase diagram of water system and explain areas, curves and triple point in it. 6

2 a. With a neat diagram, discuss the application of phase rule to the lead-silver system. 7

b. What is reformation of Gasoline? Explain reformation with suitable reactions. 6

c. Explain the production and Synthetic petrol by Bergius Method. Mention the advantages and disadvantages of power alcohol. 7

UNIT - II

3 a. What are secondary reference electrodes? Explain the construction and working of calomel electrode. 7

b. A galvanic cell is set by coupling copper and cadmium electrodes dipped in 0.5 M $CuSO_4$ and 0.25 m $CdSO_4$ solution respectively. Write the cell scheme, half cell, and net cell reactions. Calculate the EMF of the cell, if the SRP's of copper and cadmium are + 0.34 V and - 0.40 V respectively. 6

c. How fuel cells differ from batteries? Explain the construction and working of H_2 - O_2 fuel cell. 7

4 a. What are secondary batteries? Explain the construction and working of Nickel-Metal hydride battery. 7

b. What is standard electrode potential? Derive Nernst's equation or single electrode potential. 6

c. Explain the measurement of pH of solution using glass electrode. Mention the advantages of this electrode. 7

UNIT - III

5 a. Define corrosion. Explain electrochemical theory of corrosion taking iron as an example. 6

b. What is Cathodic protection? Explain sacrificial anode technique and impressed current techniques to control corrosion. 7

Contd. 2

c. What are corrosion inhibitors? Explain inhibition of corrosion by using cathodic and anodic inhibitors. 7

6 a. Explain the effect of following variables on the nature of electrode deposit : 7

i) Current density ii) Throwing power iii) pH of the electrolytic bath

b. What are the advantages of electroless plating over electroplating? Explain the electroless plating of copper on PCB. 7

c. Explain the effect of the following on the rate of corrosion : 6

i) Nature of corrosion product

ii) Relative areas of anode and cathode.

UNIT - IV

7 a. Give the synthetic and applications of the following polymers : 7

i) Urea formaldehyde resin ii) Polyurethane iii) PMMA

b. What are conducting polymers? Discuss the synthesis and applications of conducting polyaniline. 7

c. Define lubricant. Mention the important functions of lubricant. 6

8 a. What are adhesives? Give the synthesis and applications of epoxy resins. 7

b. Explain the process of Vulcanization of rubber. Give the synthesis and applications of butyl rubber. 7

c. Discuss the testing and standards of cements. 6

UNIT - V

9 a. What are liquid crystals? Explain Thermotropic and Lyotropic Liquid crystals with examples. 6

b. What are nanometerials? Give the classifications of nanomaterials with suitable examples. 7

c. Distinguish between top down and bottom up approaches in nano synthesis. Explain the synthesis of nanomaterials by chemical vapour deposition method. 7

10 a. What are boiler scales and sludges? Discuss any three ill effects of boiler scales. 7

b. Define BOD and COD. In a COD experiment 25 ml of waste water sample consumed 13.5 ml of 0.5 N $K_2Cr_2O_7$ for complete oxidation. Calculate the COD of the waste water sample. 6

c. Write a note on Sewage treatment of water. 7

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