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

(An Autonomous Institution affiliated to VTU, Belagavi)

First Semester, Chemistry -

Examination;

Engineering Chemistry

Time: 3 hrs *Max. Marks: 100*

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

UNIT - I

1 a. What are chemical fuels? Explain the characteristics of an ideal fuel and mention the advantages and gaseous fuel. 6

b. Define catalytic cracking. Describe the fluidized catalytic cracking of heavy oil. 7

c. Differentiate HCV and LCV and evaluate HCV and LCV of gaseous fuel using following data. 7

i) Volume of gaseous fuel is brunt = 0.006 m^3

ii) Mass of water circulated = 2000 gms

iii) Raise in temperature = 17.7°C

iv) Mass of water condensed = 7.7 gms

v) Specific heat of water = 4.187 kJ/kg/°C

2 a. What is knocking? Explain the mechanism and mention ill effect of knocking. 6

b. Describe the reformation and synthetic petrol by Bergius method. 7

c. Describe the production of solar grade silicon by C20 Chralski method and purified by zone refiner. 7

UNIT - II

3 a. Explain the construction, working and application of glass electrode. 6

b. Define standard electrode potential and explain the determination of PKA values of weak acid. 7

c. Evaluate the EMF of cell, ΔG and $\Delta G°$ when Ag and li electrode are in contact with 0.2 m and 0.02m $AgNo_3$ and lies solutions respectively at 25°C. Represent the cell and write half cell and net cell reactions. Given $E°_{Ag}$ = 0.80V $E°_{Li}$= - 3.05 v. 7

4 a. Describe the following characteristics of battery: 6

i) Voltage ii) Capacity and iii) Cycle life.

b. Explain the construction, working and application of lithium ion battery. 7

c. What are fuel cells? Discuss the construction, working applications of H_2-O_2 fuel cell. 7

UNIT - III

5 a. Illustrate the differential metal corrosion and differential aeration corrosion with suitable example. 6

b. What are corrosion Inhibitors? Explain how corrosion is prevented by corrosion Inhibitors? 7

c. Describe the Galvanising and Tinnig. 7

6 a. What is electro planting , explain the objective of electroplating. 6

b. Discuss the following factors affecting on electro deposit. 6
i) current density ii) throwing power iii) pH

c. Differentiate electroplating and electro-less plating and explain the electro-less plating of CU on PCB. 8

UNIT - IV

7 a. What is Tg? Describe the factors affecting on Tg. 6

b. How are the following synthesized ? 7
i) Kevlar ii) Poly carbonate iii) Thiokol

c. What are conducting polymers? Explain the synthesis and mechanism of poly-acetylene give its applications. 7

8 a. Describe the experimental method of determination % of Cao in cement solution by rapid EDTA method. 6

b. Describe adhesive. Give the synthesis and application of Araldite. 6

c. Discuss the Vulcanization and compounding of rubber 8

UNIT - V

9 a. Describe any three types of mesophases of liquid crystals . 6

b. Explain the following terms i) Nano rods ii) Nano tubes and Nano wires. 7

c. Discuss the bottom up and top down approch of Nano materials . 7

10 a. Briefly explain the Ion exchange process of purification of hard water. 6

b. What is desalination? Describe the reverse osmosis process of desalination of sea water. 7

c. Describe COD and BOD 25 ml of cofluent sample for COD analysis was reated with 15 ml of 0.2 N $K_2Cr_20_7$ solution and after the reaction the unreacted $K_2Cr_20_7$ required 19 ml of 0.15 N FAS for reaction. Under idential condtion 15 ml of $K_2Cr_20_7$ solution mixed with 25 ml of distilled water required 32 ml of 0.15 N FAS. What is the COD of the sample? 7

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