U.S.N ☐☐☐☐☐☐☐☐☐☐

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

(An Autonomous Institution affiliated to VTU, Belgaum)

First Semester, B.E. - Make-up Examination; Jan / Feb - 2017

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 are fuels? How are they classified? Mention example for each.	5
b.	Define cracking and explain fluidized catalytic cracking process.	5
c.	Explain octane number and cetane number.	5
d.	Calculate the GCV and NCV of a gaseous fuel at STP given 0.03 m^3 of the gas at STP raised the temperature of 6 kg of water by 16ºC and 13.8 cm^3 of water was collected. Specific heat of water is 4.187 kJ/kg/ºC and latent heat of steam at STP is 2.457 kJ/kg.	5
2 a.	State Gibbs phase rule. Explain the terms involved in the phase rule with example.	6
b.	Draw a neat labeled phase diagram of water system and explain areas, curves and triple point in it.	7
c.	Write short notes on :	4
	i) Reformation of Petrol ii) Unleaded petrol.	3

UNIT - II

3 a.	Define single electrode potential and derive Nernst's equation for single electrode.	5
b.	Describe the construction and working of calomel electrode.	5
c.	Explain the determination of pH of an electrolyte using glass electrode.	5
d.	A cell is formed by dipping Nickel rod in 0.01 m Ni^{2+} solution and lead rod in 0.5 m Pb^{2+} solution. The standard electrode potential of Ni and Pb are 0.24 V and -0.13 V respectively. Write the cell reaction, cell representation and calculate the emf of the cell.	5
4 a.	Discuss the following battery characteristics : i) EMF ii) Capacity iii) Shelf life.	6
b.	Explain the construction, working and applications of Nickel-Metal hydride battery.	5
c.	Write the differences between battery and fuel cell.	4
d.	Give the construction, working and applications of H_2-O_2 fuel cell.	5

UNIT - III

5 a.	Define corrosion. Explain the differential aeration theory of corrosion with example.	6
b.	Explain the cathodic protection of corrosion.	5
c.	Write a short note on corrosion inhibitors.	5

   d. Discuss the following factors on the rate of corrosion :

      i) pH   ii) Nature of metal.   4

6. a. What is metal finishing? Mention the technological importance of metal finishing.   5

   b. Explain the following factors affecting the nature of electro deposit :

      i) Complexing agent   ii) pH   iii) Temperature.   6

   c. Write the differences between electroplating and electroless plating.   4

   d. Describe the process of electroless plating of Nickel.   5

UNIT - IV

7 a. What are adhesives? Give the synthesis and applications of epoxy resin.   5

   b. Explain the preparation, properties and applications of the following polymers :

      i) PMMA   ii) Kevlar   iii) Urea formaldehyde resin.   9

   c. How silicon rubber is synthesized? Mention the applications of silicon rubber.   6

8 a. Discuss the following properties of cement :

      i) Soundness   ii) Quality   iii) Setting time.   9

   b. Write short notes on :

      i) Vulcanization   ii) Compounding of rubber.   6

   c. Define lubricant and discuss the important functions of lubricant.   5

UNIT - V

9 a. Distinguish between thermo tropic and lyotropic liquid crystals.   7

   b. Explain the applications of liquid crystals in display systems.   6

   c. How nano crystals are prepared by chemical vapour deposition method and give their applications.   7

10 a. What are boiler scales? Explain how boiler scales are formed and mention the ill effects?   6

   b. Explain the various steps involved in the treatment of water for municipal supply.   7

   c. What is desalination? Explain the desalination of sea water by electrolysis.   7

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