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## 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)

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Tim	ne: 3 hrs Max. Marks: 100	
Note	e: i) Answer <b>FIVE</b> full questions, selecting <b>ONE</b> 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	8
	Boy's calorimeter.	0
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,	
	$Z_n \mid Z_n^{2+}(0.1M) \mid A_g^{+}(1.0M) \mid A_g$	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:	
	i) Capacity ii) Voltage	8
	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 <sub>2</sub> -O <sub>2</sub>	
	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:	_
	i) Nature of the metal ii) Nature of the corrosion product iii) Temperature.	6
c.	Explain corrosion control by cathodic protection.	8

c. Explain corrosion control by cathodic protection.

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6 a. Write a note on corrosion inhibitors.	6
b. Mention the technological importance of metal finishing. Explain electroless plating of $C_{\rm u}$ on $\overline{PCP}$	8
PCB.	
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.	O
b. Give the synthesis and applications of polyurethane and Butyl rubber.	6
c. Explain the synthesis, properties and applications of ureaformaldehyde formal dehyde 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 :	
i) Shrinkage ii) Setting Time	8
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 efficient which consumes 15.0 ml of	_
0.025 M K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> 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 electrodialysis.	6