**CHY201**

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M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

SEMESTER END EXAMINATIONS – MAY / JUNE 2014Course & Branch : **B.E.- Common to All Branches**Semester : **II**Subject : **Engineering Chemistry**Max. Marks : **100**Subject Code : **CHY201**Duration : **3 Hrs****Instructions to the Candidates:**

- Answer one full question from each unit.

UNIT – I

- Derive Nernst equation for single electrode potential. (05)
 - Distinguish between the characteristics of a galvanic cell and electrolytic cell. (05)
Give an example each.
 - Write the electrode reactions and calculate the potential of the cell (05)
containing $Zn|Zn^{2+}$ and $Cu^{2+}|Cu$ couple, if the Zn^{2+} and Cu^{2+}
concentration are 0.1 M and 1.0×10^{-2} M respectively.
 $E^0_{Zn^{2+}/Zn} : -0.76V$, $E^0_{Cu^{2+}/Cu} : +0.34V$
 - With a neat graph explain the variation of conductance in following (05)
conductometric titrations where (i) CH_3COOH is titrated against $NaOH$
(ii) H_2SO_4 is titrated against NH_4OH .
- With a neat sketch and equation, give a brief account of what happens when (05)
a zinc rod is in contact with zinc sulphate solution of low concentration.
 - Explain the determination of P^H of solution using Glass electrode. (05)
 - Calculate the $E^0_{Cu^{2+}/Cu}$, given $E_{Cu^{2+}/Cu} = 0.296$ V and concentration of (05)
 $Cu^{2+} = 0.015$ M.
 - Describe the application of potentiometry for precipitation titration taking (05)
silver nitrate and potassium chloride as example.

UNIT – II

- With an example each give a brief account of classification of batteries. (05)
 - Write the net cell reactions taking place during discharge in the following (05)
batteries (i) Ni-Cd battery (ii) Zinc-air battery (ii) Nickel-metal hydride
battery and (iv) Lithium- MnO_2 battery.
 - Give an account of construction and working of methanol-oxygen fuel cell. (05)



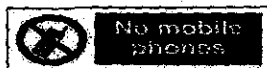
- d) Describe the experimental procedure for the determination of copper by colorimetry. (05)
4. a) Discuss the battery characteristics (i) Voltage (ii) Power density and (iii) Cycle life. (05)
- b) What are fuel cells? Give their classification (05)
- c) Give an account of construction and working of hydrogen-oxygen fuel cell. (05)
- d) Explain the estimation of sodium by Flame photometry in given water sample. (05)

UNIT - III

5. a) Explain rusting of iron with the help of electrochemical theory of corrosion. (05)
- b) Explain the effect of the following factors on the rate of corrosion (i) Nature of corrosion product (ii) pH of the surroundings. (05)
- c) With an example each distinguish between thermotropic liquid crystals and lyotropic liquid crystals. (05)
- d) Describe how liquid crystals can be used in liquid crystal display. (05)
6. a) What is cathodic protection? Explain the sacrificial anode method to prevent corrosion. (05)
- b) Explain: (i) Water line corrosion (ii) Bimetallic corrosion. (05)
- c) With an example, give an account of chemical composition of liquid crystals. (05)
- d) Taking PAA as an example describes liquid crystalline behavior in homologous series. (05)

UNIT - IV

7. a) What is meant by hardness of water? How is it classified? (05)
- b) What is COD of waste water. How it is estimated. (05)
- c) Write the experimental procedure for the determination of chloride by argentometric titration (05)
- d) What is reverse osmosis? How sea water is purified using this technique? (05)
8. a) Describe the estimation of permanent hardness in water using EDTA. (05)
- b) Write the experimental procedure for the determination of nitrate using phenol disulphide (spectroscopically) (05)
- c) Write a short note on secondary sewage treatment. (05)
- d) What are ion-exchange resins? Discuss their application in water-softening. How is the spent resin regenerated? (05)



CHY201

UNIT - V

9. a) What is meant by cracking of petroleum With a neat diagram, give an account of fluidized bed catalytic cracking. (05)
- b) Explain emulsion polymerization technique with advantages. (05)
- c) Explain the free radical mechanism of addition polymerization taking polymerization of ethylene as example. (05)
- d) Write the mechanism of conduction in polyacetylene by oxidative doping (p-doping). (05)
10. a) What is meant by knocking of petroleum in IC engine and how can it be reduced? (05)
- b) Distinguish between suspension polymerization and solution polymerization. (05)
- c) Write the name and structure of the monomer(s) used in the synthesis of (i) Teflon (ii) Epoxy resin (iii) Polyurethane. Mention any one application of each of the above polymers. (05)
- d) Describe how Molecular weight polymer and Cross-linking, affect glass transition temperature of a polymer. (05)
