Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 86611

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

First Semester

Civil Engineering

HS 1103 – ENGINEERING CHEMISTRY – I

(Common to All Branches)

(Regulations 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Calculate the hardness of water which contains 8.1 mg of $CaCl_3$ per litre.

2. Distinguish the two types of water.

3. Differentiate between physisorption and chemisorption.

4. What is adsorption isotherm?

5. Define reference electrode.

6. Electrode potential of zinc is assigned a negative value; whereas that of copper a positive value. Account for this.

7. Distinguish primary and secondary batteries.

8. What are solar cells?

9. Define Beer-Lambert's law.

10. Mention any two applications of IR spectroscopy.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss reverse osmosis method in detail with a neat diagram. (8)

(ii) What is boiler feed problems? Explain any two in detail. (8)

Or

(b) (i) Explain any two internal conditioning of water in detail. (8)

(ii) What are the various methods adopted for the treatment of Domestic water? (8)

12. (a) (i) Discuss the factors that influence the adsorption of gases on solids. (8)

(ii) Explain the principle of ion-exchange adsorption and its application. (8)

Or

(b) (i) Compare Frendlich and Langmuir isotherms and the conditions of their applicability. (8)

(ii) Explain the role of adsorbents in catalysis. (8)

13. (a) (i) A cell is formed by dipping Zn rod in 0.01 M Zn^{2+} solution and Ni rod in 0.5 M Zi^{2+} solution. The standard electrode potentials of Zn and Ni are – 0.76 V and – 0.25 V respectively. Write the cell representation, cell reaction and calculate the emf of the cell. (8)

(ii) Explain the construction and working of quinhydrone electrode. Discuss its merits and limitations. (8)

Or

(b) (i) What are potentiometric titrations? Show how the end points are obtained in redox and precipitation reactions. (8)

(ii) Discuss the construction and functioning of a calomel electrode. (8)

14. (a) (i) Explain the construction and working of lead acid storage battery. Show the reactions involved. (8)

(ii) What is a nuclear reactor? Explain the essential parts of a nuclear reactor. (8)

Or

(b) (i) How is Ni-cd cell constructed? Explain its working. (8)

(ii) What is a fuel cell? Explain the working of hydrogen – oxygen fuel cell. (8)

15. (a) (i) How is iron estimated by calorimetric analysis? Explain. (8)

(ii) Explain the principle and instrumentation of UV Visible Spectroscopy. (8)

Or

(b) (i) Discuss the flame photometry to estimate sodium. (8)

(ii) Explain the principle, and instrumentation of AAS. (8)

———————