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Question Paper Code : 63230

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

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. What is Break point chlorination?
2. What are the salts responsible for the temporary and permanent hardness of water?
3. How does the nature of the gas influence the adsorption of gases on solids?
4. Explain the concept of Freundlich's adsorption isotherm.
5. Identify the limitations of standard hydrogen electrode.
6. Calculate the equilibrium constant of the reaction : $\text{Ag}^+ + \text{Fe}^{2+} \rightarrow \text{Ag} + \text{Fe}^{3+}$ at 35°C ($E^\circ_{\text{Fe}^{3+}/\text{Fe}^{2+}} = 0.77\text{V}$ and $E^\circ_{\text{Ag}^+/\text{Ag}} = 0.80\text{V}$).
7. Write the various nuclear fission reactions of ${}_{92}\text{U}^{232}$.
8. Write the chemical reactions taking place in a lead - acid battery when it is charged.
9. Methane does not absorb IR energy. Why?
10. Most absorption bands in the visible-UV spectra are very broad. Give reasons.

PART B — (5 × 16 = 80 marks)

11. (a) (i) How will you determine the alkalinity of water experimentally? (10)
(ii) Describe the zeolite process for softening of hard water using a suitable sketch. (6)

Or

- (b) (i) What are the disadvantages due to the impurities present in the boiler feed water? (8)
(ii) Write short notes on phosphate conditioning and Calgon conditioning. (8)
12. (a) (i) Derive Langmuir adsorption isotherm. (8)
(ii) Explain in detail the role of adsorption in catalysis. (8)

Or

- (b) (i) Write informative notes on Ion-exchange adsorption. (8)
(ii) Discuss the various factors that affects the adsorption of a gas on solid adsorbent. (8)
13. (a) (i) Derive the Nernst equation for single electrode potential. (8)
(ii) Discuss the titration curves in the conductometric titration of HCl Vs. NaOH. (4)
(iii) Find the oxidation potential of $Zn/Zn^{2+} = 0.2M$ electrode at $25^{\circ}C$. Standard oxidation potential of $Zn/Zn^{2+} = 0.763V$. (4)

Or

- (b) (i) Describe how iron can be estimated by potentiometric titration. (6)
(ii) How is Calomel electrode constructed? Discuss how this electrode may be used for the determination of pH of a solution. (10)
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) Elaborate on the principle and instrumentation of IR spectroscopy. (8)
- (ii) Discuss the principle and estimation of sodium by flame photometry. (8)

Or

- (b) (i) Explain the estimation of nickel by atomic absorption spectroscopy. (8)
- (ii) With a block diagram of UV-visible spectrophotometer explain the estimation of iron by colorimetry. (8)
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