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<b>Question Paper Code : 80403</b>
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B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Second Semester

Civil Engineering

CY 2161/CY 24 — ENGINEERING CHEMISTRY — II

(Common to all branches)

(Regulations 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is single electrode potential?
2. What are ion selective electrodes?
3. Why is the rate of corrosion of impure zinc very much higher than that of pure zinc?
4. What is the mechanism of stress corrosion? Give a suitable example.
5. Calculate the calorific value of a fuel sample of coal with the following data:
  - (a) Mass of coal : 0.6 g
  - (b) Water equivalent of calorimeter : 2200 g
  - (c) Specific heat of water:  $4.187 \text{ kJkg}^{-1}\text{C}^{-1}$
  - (d) Increase in temperature :  $6.52^\circ\text{C}$ .
6. Write the mechanism of knock in petrol engines.
7. What is an eutectic system?
8. Give the composition and use of brass and bronze.
9. Mention any two applications of UV spectroscopy.
10. State the principle involved in colorimetric analysis.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Differentiate reversible and irreversible cells? Illustrate with examples. (8)
- (ii) Derive the Nernst equation for a single electrode potential? (8)

Or

- (b) (i) Describe the standard hydrogen electrode and its use in the determination of single electrode potential. (8)
- (ii) Explain the potentiometric redox titration of  $\text{FeSO}_4$  vs  $\text{K}_2 \text{Cr}_2 \text{O}_7$  with neat diagram. (8)
12. (a) (i) Discuss the factors associated with the metal which affects the rate of corrosion. (8)
- (ii) How is corrosion protection of underground iron pipelines and railway lines carried out? (8)

Or

- (b) (i) State the constituents of an oil paint with examples and explain their functions. (8)
- (ii) Explain metallic coating of nickel by
- (1) electroplating and
- (2) electroless plating. (8)
13. (a) Explain the types of petrol cracking.

Or

- (b) (i) Write briefly about the techniques to prevent knocking. (8)
- (ii) Explain the methods of production of synthetic petrol. (8)
14. (a) (i) Explain the phase diagram of water in detail with a neat diagram. (10)
- (ii) Define phase, component and degrees of freedom with suitable example. (6)

Or

- (b) (i) Explain the phase diagram of lead silver system. (8)
- (ii) What is condensed phase rule? What is its significance? (8)

15. (a) (i) Write the principle of UV spectroscopy. (6)
- (ii) Write the mechanism of interaction between the vibrating molecule and infra-red radiation. (6)
- (iii) A solution of thickness 2 cm. transmitted 40% incident light. Calculate the concentration of this solution, given that the molar absorptivity is  $6000 \text{ dm}^3 \text{ mol}^{-1} \text{ cm}^{-1}$ . (4)

Or

- (b) (i) Explain briefly the principle of a flame photometer. A sample solution is found to contain KCl and NaCl. How will you determine the amount of NaCl alone present in the solution using a flame photometer? (10)
- (ii) Compare : Flame photometry and Atomic absorption spectroscopy. (6)

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