



B.E/B.TECH DEGREE EXAMINATIONS: APRIL/ MAY 2024

(Regulation 2018)

Second Semester

COMMON TO AERO/ BIO/ EEE/ EIE/ FT/ TXT

U18CHI2202: Engineering Chemistry

COURSE OUTCOMES

- CO1:** Apply the basic principles of chemistry at the atomic and molecular level.
CO2: Analyze the impact of engineering solutions from the point of view of chemical principles.
CO3: Apply the chemical properties to categorize the engineering materials and their uses.
CO4: Integrate the chemical principles in the projects undertaken in the field of engineering and technology.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

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|-----|--|-----|-------------------|
| 1. | Explain the construction of the Calomel electrode. | CO1 | [K ₁] |
| 2. | What is the Nernst equation and its significance in electrochemistry? | CO1 | [K ₂] |
| 3. | Describe metallurgically influenced corrosion. | CO2 | [K ₁] |
| 4. | List two factors influencing corrosion. | CO2 | [K ₁] |
| 5. | Differentiate between sacrificial anodic protection and impressed current cathodic protection. | CO2 | [K ₃] |
| 6. | What is Langmuir's adsorption isotherm? | CO1 | [K ₂] |
| 7. | Explain catalytic poisoning with an example. | CO4 | [K ₁] |
| 8. | Define degree of polymerisation. | CO3 | [K ₁] |
| 9. | Mention the disadvantages of hard water in boilers. | CO1 | [K ₁] |
| 10. | What is Gibbs Helmholtz equation? | CO1 | [K ₂] |

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11. **Scenario:** A coastal power plant uses seawater for its cooling system. Over time, the metallic components of the cooling system experience significant corrosion, leading to frequent maintenance and replacements.
- a) Identify and explain the type of corrosion occurring in this scenario. 7 CO2 [K₄]
- b) Suggest and describe two corrosion control methods that could be applied to mitigate this issue. 7 CO2 [K₄]
- c) Explain the role of inhibitors in corrosion control. 2 CO1 [K₃]
12. **Scenario:** A manufacturing company produces electronic devices that require high-purity water in their processes. The local water supply is hard water, which leads to scaling and inefficiency in their operations.
- a) Discuss the disadvantages of using hard water in the manufacturing process. 7 CO2 [K₄]
- b) Describe two methods to soften hard water, highlighting the principles behind each method. 7 CO2 [K₄]
- c) Explain the process of reverse osmosis used in water desalination. 2 CO1 [K₃]
13. a) Explain the working principle of a glass electrode and its application in pH measurement. 7 CO1 [K₃]
- b) Discuss the applications of adsorption in pollution abatement, referencing Freundlich's adsorption isotherm. 7 CO3 [K₅]
- c) Define hybridization and provide an example of sp² hybridization in organic molecules. 2 CO1 [K₂]
14. a) Compare and contrast the properties and applications of PET and PVC. 7 CO3 [K₄]
- b) Explain the role of enzymes in catalysis and provide an industrial application. 7 CO4 [K₅]
- c) List the characteristics of hydrogen bonding in molecules. 2 CO1 [K₂]
15. a) What are the various functions of lubricants? Discuss any two properties of lubricants. 7 CO3 [K₂]
- b) Explain the impact of hydrophobic interactions in biological systems. 7 CO4 [K₄]
- c) What are the different types of Van der Waals forces? Provide examples. 2 CO1 [K₂]
16. a) Derive Clausius-Clapeyron equation for two Phase system. 7 CO4 [K₃]
- b) Explain the second law of thermodynamics with an example relating to real-time situation. 7 CO4 [K₃]
- c) What is the Third Law of Thermodynamics? 2 CO1 [K₂]
