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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech I SEMESTER END EXAMINATIONS (REGULAR) - FEBRUARY 2024

Regulation: BT23

## ENGINEERING CHEMISTRY

Time: 3 Hours

COMMON TO CSE | CSE (CS) | CSE (DS)

Max Marks: 60

Answer ALL questions in Module I and II

Answer ONE out of two questions in Modules III, IV and V

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

### MODULE – I

- (a) What is an electrochemical series? Give its applications with a suitable example.  
[BL: Understand| CO: 1|Marks: 6]
- (b) Illustrate the construction and working of Li-ion batteries. Give the importance for applications of Li-ion batteries to electric vehicles  
[BL: Understand| CO: 1|Marks: 6]

### MODULE – II

- (a) Explain the disinfection process of water by chlorination with appropriate chemical equations. Give its advantages and disadvantages.  
[BL: Understand| CO: 2|Marks: 6]
- (b) A given 100ml of the water sample required 20ml of 0.01M EDTA with EBT as indicator. 100 ml of the same sample after boiling and filtering required 10ml of 0.01M EDTA. Calculate total, carbonate and non-carbonate hardness of given water sample.  
[BL: Apply| CO: 2|Marks: 6]

### MODULE – III

- (a) Summarize about vulcanization of rubber. Interpret why natural rubber needs vulcanization and explain how is it carried out?  
[BL: Understand| CO: 3|Marks: 6]
- (b) Describe in detail about bio degradable polymers and mention preparation, properties and uses of polylactic acid and polyvinyl acetate  
[BL: Understand| CO: 3|Marks: 6]
- (a) Distinguish between
  - Addition and condensation polymerization
  - Thermosetting and thermoplastic polymers  
[BL: Understand| CO: 4|Marks: 6]
- (b) Elaborate synthetic methods, properties and applications of following.
  - PVC
  - Bakelite  
[BL: Understand| CO: 4|Marks: 6]

## MODULE – IV

5. (a) Write an account on refining of petroleum by explaining the composition, boiling range and use of different fractions obtained during refining. [BL: Understand| CO: 5|Marks: 6]
- (b) Describe the ultimate analysis of coal to determine its chemical constituents. Mention its significance. [BL: Apply| CO: 5|Marks: 6].
6. (a) State the advantages of gaseous fuels. Give the composition, characteristics and applications of compressed natural gas. [BL: Understand| CO: 5|Marks: 6]
- (b) A sample of 2.5 gm of coal was weighed into a silica crucible. After heating for one hour at  $110^{\circ}\text{C}$ , the residue weighed is 1.785gm. After heating for seven minutes at  $950^{\circ}\text{C}$ , the residue weighed is 1.528 gm. The crucible was then heated at  $750^{\circ}\text{C}$  without a lid for half an hour until a constant weight of 0.245gm residue was obtained. Calculate the percentage results of the analysis. [BL: Apply| CO: 5|Marks: 6]

## MODULE – V

7. (a) Give the composition of Portland cement. Discuss the setting and hardening process of Portland cement. [BL: Understand| CO: 6|Marks: 6]
- (b) Outline preparation, reaction, properties and application of Polyacryl amide and Poly vinyl amides. [BL: Understand| CO: 6|Marks: 6]
8. (a) Describe the construction and working of Pensky-Marten's apparatus for the detection of flash and fire points of lubricant oil [BL: Understand| CO: 6|Marks: 6]
- (b) Why is the thin-film lubrication needed? Mention the lubricants used for thin-film lubrication and state their good qualities. [BL: Understand| CO: 6|Marks: 6]

