Code No: 182AH **R22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech I Year II Semester Examinations, January/February - 2024
ENGINEERING CHEMISTRY
(Common to CE, ME, ECE, EIE, AE, BT, MIE, PCE, CSE(AI&ML), CSE(IOT), AI&DS, AI&ML)

Time: 3 Hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.
- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

(10 Marks)

1.a)	What are the salts responsible for temporary and permanent hardness of water?	[1]
b)	Why is water softened before using in boiler?	[1]
c)	What are fuel cells?	[1]
d)	Why does corrosion occur in steel pipe connected to copper plumbing?	[1]
e)	Why thermosetting plastics cannot be reused?	[1]
f)	What do you mean by biodegradation of polymers?	[1]
g)	What is an anti-knocking agent?	[1]
h)	What is a petroleum?	[1]
i)	What are the constituents of cement?	[1]
j)	What are the main types of lubricants?	[1]

PART - B

(50 Marks)

2.a) What are the essential requirements of domestic water? Explain the various steps involved in the supply of water in a municipality or for domestic use.
b) Explain the process of reverse osmosis. [6+4]

OR

3.a) Discuss the softening of hard water by ion-exchange process. Write necessary equations.
b) 0.05g of $CaCO_3$ was dissolved in dil. HCl and diluted to 1000 mL. 50 mL of this solution requires 48 mL of EDTA solution for titration. 50 mL of hard water sample requires 15 mL of EDTA solution for titration. 50 ml of same water sample after boiling, filtering, requires 10 mL of EDTA solution. Calculate the different kinds of hardness of water in ppm. [6+4]

4.a) Explain the factors affecting the rate of corrosion.
b) Explain the construction and working of a Lithium ion battery with reactions taking place during charging and discharging. [5+5]

OR

5.a) Explain electrochemical corrosion and discuss the mechanism by taking suitable example.
b) Explain the working principle of methanol-oxygen fuel cell with reactions. [5+5]

6.a) Discuss the mechanism of condensation polymerization with examples.
b) Explain the preparation, properties and uses of Nylon 6, 6. [5+5]

OR

7.a) Explain the preparation, property and uses of Bakelite.
b) What are conducting polymers? How does a non-conducting polymer become conducting? [5+5]

8.a) What is Cracking of Petrol? How will you apply moving bed catalytic cracking to refine the petroleum?
b) Calculate the gross and net calorific values of coal having the following compositions, carbon = 85%, hydrogen = 8%, sulphur = 1%, nitrogen = 2%, ash = 4%, latent heat of steam = 587 cal/gm. [5+5]

OR

9.a) Why CNG is preferred over LPG? Justify.
b) How can you analyze the quality of petrol and diesel by its octane and cetane rating? Explain. [5+5]

10.a) What are synthetic lubricants? Synthetic lubricants have an added advantage over natural lubricants. Explain.
b) What are the different methods of manufacturing cement? Explain their relative merits and demerits. [5+5]

OR

11.a) Explain the mechanism of setting and hardening of cement.
b) Write a short note on cloud and pour points. [5+5]

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