

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

UG Model question paper

Time: 3 hours

Engineering Chemistry

Max Marks: 70

Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks.

Section-I

- 1 a) What are Reference electrodes? Explain the construction and working of Saturated Calomel electrode with the help of a neat sketch. [7M]
b) Derive Nernst equation and its applications [4M]
c) Define conductance, equivalent and molar conductance. Give their units. [3M]

OR

- 2 a) Sort out the differences between primary and secondary batteries [2M]
b) Explain the construction and working of Lead-Acid storage cell with neat sketch. [6M]
c) Explain the construction and working of Alkaline fuel cell with neat sketch. [6M]

Section-II

- 3 a) Explain the various factors affecting corrosion [7M]
b) What is electrochemical corrosion. Explain the mechanism of electrochemical corrosion by evolution of hydrogen and absorption of oxygen? [7M]

OR

- 4 a) Define Cathodic protection. Explain sacrificial anodic protection and impressed current cathodic protection method with applications [7M]
b) Define Hot Dipping. Explain the process of galvanization and Tinning with the help of a neat sketch [7M]

Section-III

- 5 a) Define natural rubber, classification. Explain the process of vulcanization of rubber [7M]
b) Explain the preparation, properties and applications of Bakelite, Teflon and polyethylene? [7M]

OR

- 6 a) What are conducting polymers. Explain the classification and mechanism of conducting polymers [7M]
b) Write a note on (i) flash and firepoint (ii) cloud and pour point [7M]

Section-IV

- 7 a) Write a note on (i) Scales and sludges (ii) Caustic embrittlement (iii) priming and foaming [7M]
b) Explain zeolite process with the help of a neat sketch [7M]

OR

- 8 a) What is desalination of brackish water? Explain Reverse Osmosis and its significance. [4M]
b) Explain about breakpoint chlorination [4M]
c) Explain Ion Exchange process with the help of a neat sketch. [6M]

Section-V

- 9 a) Explain the proximate analysis of coal with its significance. [7M]
b) Define petroleum. Explain refining of petroleum by fractional distillation [7M]

OR

- 10 a) Define cracking. Explain the process of fixed bed catalytic cracking with a neat sketch. [7M]
- b) Define calorific value ,HCV,LCV. Explain the calorific value of gaseous fuel by Junkers gas calorimeter [7M]

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Section-I

1. a) Explain the construction, working and applications of Quinhydrone electrode. [7M]
b) Define molar, equivalent and specific conductance. Write their units and formulas. [7M]

OR

2. a) Define fuel cell? Explain the construction and working of H₂-O₂ fuel cell. [7M]
b) Explain the construction, working and applications of Lead acid storage cell. [7M]

Section-II

3. a) What is cathodic protection. Explain both sacrificial anodic and ICCP protection methods. [10M]
b) Define Galvanising and Tinning. [4M]

OR

4. a) Explain the mechanism of electrochemical corrosion by evolution of hydrogen with example. [7M]
b) What are the factors which influence corrosion of metals. Explain. [7M]

Section-III

5. a) Explain preparation, properties and applications of Teflon and Bakelite. [10M]
b) Define Thermoplastics and Thermosetting resins. [4M]

OR

6. a) What are bio degradable polymers. Explain preparation, properties and applications of PVA. [10M]
b) What are the characteristics of a good lubricant. [4M]

Section-IV

7. a) Explain Internal treatment methods of boiler feed water. [6M]
b) Discuss the reverse osmosis method of purification of water. [5M]
c) Define temporary and permanent hardness. [3M]

OR

8. a) What is breakpoint chlorination? Write its significance. [7M]
b) Explain the softening of hard water using Zeolite process. Give merits and demerits of process. [7M]

Section-V

9. a) Explain the proximate and ultimate analysis of coal. [14M]

OR

10. a) What is HCV and LCV of a gaseous fuels? Write their interrelationships. [7M]
b) What is Cracking? Explain the fixed bed catalytic cracking with neat sketch. [7M]

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Section-I

1. a) Write Nernst equation and give its applications [3M]
- b) Give a detailed account on the Lead –Acid cell with appropriate chemical reactions. [6M]
- c) Explain the construction and working of a Galvanic cell. [5M]

OR

2. a) Explain the construction and functioning of H₂-O₂ fuel cell. Give the advantages and applications of fuel cells. [6M]
- b) Explain the construction and working of Calomel electrode [6M]
- c) What is an electrochemical series. Write two important applications. [2M]

Section-II

3. a) Explain rusting of iron with the help of electrochemical theory of corrosion. [7M]
- b) Explain the processes of Galvanising and Tinning. [7M]

OR

- 4 a) What is cathodic protection. Explain methods of cathodic protection. [6M]
- b) Discuss how nature of metal and nature of environment affect the rate of corrosion [4M]
- c) Explain Electroless plating. [4M]

Section-III

- 5 a) Differentiate thermoplastic resins and thermoset resins. [2M]
- b) Write the preparation properties and applications of Teflon, Dacron and Bakelite. [7M]
- c) Give the characteristics of a good lubricant and explain flash and fire points. [5M]

OR

- 6 a) What are conducting polymers. Explain the mechanism of conduction in polyacetylene. [7M]
- b) Explain vulcanization of rubber. Write the preparation, properties and applications of butadiene-S butyl rubber. [7M]

Section-IV

- 7 a) Write a note on caustic embrittlement, priming and foaming. [7M]
- b) How municipal water is disinfected by chlorination and ozonisation. Explain breakpoint chlorination. [7M]

OR

- 8 a) Explain Zeolite process for softening of water. How exhausted zeolites are regenerated. [7M]
- b) Explain how scales and sludges are formed in boilers. Write about Phosphate and Calgon conditioning for prevention of scales. [7M]

Section-V

- 9 a) Define HCV and LCV. [2M]
b) Explain ultimate analysis and give its significance. [6M]
c) Explain the process of refining of petroleum in detail. [6M]

OR

- 10 a) What is cracking. Explain in detail about fixed bed catalytic cracking with a neat sketch. [6M]
b) Give brief note on octane and cetane rating. [5M]
c) Discuss the constituents, characteristics and applications of LPG and CNG. [3M]

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Section-I

1. a) Explain the construction & working of quinhydrone electrode. [7M]
b) Define equivalent conductance and its unit. [2M]
c) Explain galvanic cell with neat diagram [5M]

OR

2. a) Explain the construction of hydrogen oxygen fuel cell. [7M]
b) Define secondary batteries with Lead acid cells. [4M]
c) Derive Nernst equation. [3M]

Section-II

3. a) Explain electrochemical corrosion. [7M]
b) Write about factors affecting rate of corrosion: [3M]
(i) Temperature (ii) Passivity (iii) Humidity
c) Write short notes on: [4M]
(i) Galvanic corrosion (ii) Metal Cladding

OR

4. a) Explain the process of galvanizing and tinning. [7M]
b) Describe the method of cathodic protection . [7M]

Section-III

5. a) Define biodegradable polymer. Write preparation, properties & applications of polyvinylacetate [5M]
b) Define elastomers. Give the preparation and application of [5M]
(i) Buty rubber (ii) Buna-S
c) Explain the difference between thermoplastics & thermosetting plastics. [4M]

OR

6. a) Outline the preparation properties and uses of [4M]
(i) Bakelite (ii) Nylon-6,6 (iii) PVC
b) Illustrate characteristics of good lubricants [3M]
c) Explain flash, fire point and cloud, pour point properties of lubricants. [7M]

Section-IV

7. a) Explain break point chlorination. [4M]
b) Explain ion exchange process. [4M]
c) Explain reverse osmosis [2M]
d) Write short note on: [4M]
(i) Scales (ii) Colloidal Conditioning (iii) Calgon Conditioning

OR

8. a) Explain softening of water by zeolite process. [4M]
b) Define caustic embrittlement with reaction. How can this be prevented? [4M]
c) Write short note on: [4M]
(i) Priming (ii) Phosphate Conditioning (iii) Sludge
d) Explain sterilization of water by chlorination. (2M)

Section-V

9. a) Describe the Fischer Tropsch's process of synthetic petrol. [5M]
b) Define cracking. Discuss any one method of catalytic cracking. [5M]
c) Define octane number [4M]

OR

10. a) Explain knocking in internal combustion engine & prevention of knocking. [5M]
b) Define petroleum. How is it refined by fractional distillation? Write various fractions with boiling range. [5M]
c) Define cetane number [4M]