Code No: 131AG **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year I Semester Examinations, December – 2019/January - 2020
ENGINEERING CHEMISTRY
(Common to EEE, ECE, CSE, EIE, IT)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) What is Calgon conditioning. [2]
b) A water sample has a hardness of 26 ppm. Express its hardness in degree Clarke and degree French. [3]
c) Differentiate Primary and Secondary cells. Give one example for each. [2]
d) What are the advantages of fuel cells. [3]
e) Write the advantages of biodegradable polymers. [2]
f) How would you prepare Thokol rubber? Give the reaction. [3]
g) Describe classification of fuels based on occurrence. [2]
h) What is proximate analysis of coal? Give its significance [3]
i) Give any two engineering applications of composite materials. [2]
j) What are the essential constituents of high alumina cement? [3]

PART-B

(50 Marks)

2.a) Explain Ion exchange method for softening water.
b) A standard hard water sample is prepared by dissolving 1 gm of Calcium carbonate in 1 litre of distilled water. 20 ml of this sample has consumed 18 ml of EDTA on titration. A hard water sample has consumed 15 ml of EDTA solution on titration. The hard water is boiled, cooled, filtered, and 20 ml of this is titrated against EDTA which consumed 10 ml. Calculate the temporary, permanent and total hardness of the water sample. [5+5]

OR

3.a) What is reverse osmosis? Describe how the desalination can be achieved by reverse osmosis.
b) Explain complexometric estimation method for the determination of temporary and permanent hardness of water. [5+5]

4.a) What is electrochemical series? Explain its applications with suitable examples.
b) Explain the construction of Calomel electrode with a neat diagram. Give the chemical reactions involved when it is acting as anode and cathode. [5+5]

OR

5.a) Explain the construction and chemical reactions involved in charging and discharging of Pb- Acid storage battery.

b) Calculate the EMF of the following cell.
$Zn/Zn^{+2}(0.01M)//Fe^{+2}(0.02M)/Fe$
(The standard potential of the Zn^{+2}/Zn = -0.763 v and Fe^{+2}/Fe = 0.44 V). [5+5]

6.a) Define and Differentiate thermoplastic from thermosetting plastics.

b) Give the synthesis, properties and applications of PVC and nylon-6,6. [5+5]

OR

7.a) Give the structure of natural rubber. What are its disadvantages? Explain the vulcanisation process.

b) Why bio degradable polymers are needed in current situation? Write the applications of biodegradable polymers by taking suitable example. [5+5]

8.a) How to determine nitrogen in a coal using ultimate analysis.

b) Explain the refining process of petroleum. [5+5]

OR

9.a) What is cracking? How it is used in synthesis of petrol.

b) Define combustion and calculate amount of air required for complete composition of 1kg coal containing following composition: (C = 90%, H = 2%, S = 5%, O = 3%). [5+5]

10.a) Explain the characteristics of good lubricants.

b) Define flash point and fire point? Discuss their importance. [5+5]

OR

11.a) Discuss the significance of the properties refractoriness and porocity with references to Refractories.

b) Explain the setting and hardening of cement with chemical reactions involved in it. [5+5]

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