R16

Code No: 132AG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year II Semester Examinations, April - 2018
ENGINEERING CHEMISTRY
(Common to CE, ME, MCT, MMT, AE, MIE, PTM, CEE, MSNT)

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 defluoridation? Mention a technique of it. [2]
b) A sample of water contains 0.438g of $Mg(HCO_3)_2$, 38mg of $MgCl_2$, 2.43mg of $Ca(HCO_3)_2$ and 13.6mg of $CaSO_4$ per liter. What is its temporary and permanent hardness. [3]
c) Write the discharging and recharging reactions of Ni-Cd cell. [2]
d) Calculate the emf of the galvanic cell consisting of Fe and Ag electrodes the concentration of Fe^{+2} is 0.2M and Ag^+ is 0.02M, if E^o of Fe/Fe^{+2} = 0.44V and that of Ag/Ag = 0.8V. [3]
e) Give the advantages and applications of polylactic acid. [2]
f) Differentiate between thermoplastics and thermosets. [3]
g) Give the composition and uses of LPG and CNG. [2]
h) Calculate the GCV and NCV of a fuel having the following composition. 80% carbon, 8% hydrogen, 3% sulphur, 2% ash and 4% nitrogen. [3]
i) Give the characteristics of a good refractory. [2]
j) Give the applications of composites. [3]

PART-B

(50 Marks)

2.a) Discuss the principle involved in the estimation of hardness of water by complexometric titration using EDTA.
b) Explain the process of reverse osmosis. How is it useful in softening of water? [5+5]

OR

3.a) 50 ml of a standard hard water consumed 25 ml of EDTA. 10 ml of the same EDTA was consumed for 25 ml of water sample before boiling and 8 ml of same EDTA was consumed after boiling. Calculate the hardness of water sample. The standard hard water was prepared by dissolving 0.5 g of $CaCO_3$ in 250 ml of water.
b) Discuss the steps involved in the treatment of sewage water. [5+5]

4.a) Explain the construction and working of glass electrode.
b) What is a fuel cell? Explain the construction and functioning of methanol-oxygen fuel cell. [5+5]

OR

5.a) What is Daniel cell? Give its cell notation, construction and cell reactions.
b) Explain the construction, charging and discharging reactions of lithium-ion cell. [5+5]

6.a) Discuss the free radical addition polymerization of ethene.
b) Give the preparation, properties and engineering applications of Bakelite. [5+5]

OR

7.a) What is conducting polymer? Give the characteristics and classification of conducting polymers with suitable examples.
b) Write the structure of natural rubber. Explain its vulcanization and its advantages. [5+5]

8.a) Describe the proximate analysis of coal and give its significance.
b) Calculate the minimum amount of air required for the complete combustion of a fuel having the following composition.
74% carbon, 6% hydrogen, 4% ash, 3% Sulphur and 4% Nitrogen. [5+5]

OR

9.a) With a neatly sketched diagram, explain the refining of petroleum.
b) What is knocking? How do you rate the quality of petrol and diesel? [5+5]

10.a) How are the refractories classified? Explain the porosity and chemical inertness of refractories.
b) Explain the chemistry involved in the setting and hardening of Portland cement. [5+5]

OR

11.a) What are composites and their constituents? How composite materials are classified?
b) What are lubricants? What are their functions? Explain thin film lubrication. [5+5]

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