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[5056]-13

F.E. EXAMINATION, 2016
ENGINEERING CHEMISTRY
(2015 PATTERN)

Time : Two Hours

Maximum Marks : 50

N.B. :— (i) Neat diagram must be drawn wherever necessary.

(ii) Figures to the right indicate full marks.

(iii) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.

(iv) Assume suitable data, if necessary.

1. (a) Explain zeolite process of softening of water with figure, process, ion exchange and regeneration reactions along with advantages. [6]
- (b) Explain the titration curve for conductometric titration in case of strong acid-strong base titration. [3]
- (c) What is reference electrode ? Draw neat labelled diagram of glass electrode and give its representation. [3]

Or

2. (a) Explain different types of electronic transitions that occur in an organic molecule after absorbing uv radiations. [6]

P.T.O.

- (b) State the problems in traditional synthesis route and advantages of green route in manufacture of polycarbonate. [3]
- (c) 100 ml of an alkaline water sample requires 5.2 ml of N/50 HCl upto phenolphthalein end point and 15.8 ml for methyl orange end point. Find the type and amount of alkalinity in water sample. [3]
3. (a) Define vulcanization. Explain vulcanization of natural rubber along with chemical reaction involved. Compare natural rubber with vulcanized rubber with respect to any 3 properties. [6]
- (b) What is power alcohol ? Give merits and demerits of power alcohol. [3]
- (c) A gaseous fuel contains : $\text{CH}_4 = 55\%$ and $\text{H}_2 = 25\%$ by volume. Calculate volume of air required for complete combustion of 1 m^3 of the gas. [3]

Or

4. (a) Explain determination of calorific value of a fuel by Bomb calorimeter with figure, construction, working and formula for calculation of GCV. Give formula with corrections for determination of GCV by Bomb calorimeter. [6]
- (b) Explain bulk polymerisation technique. Give its advantages. [3]
- (c) Give synthesis, properties and applications of LDPE. [3]

5. (a) Explain manufacturing of H_2 gas by steam reforming of : [5]
(i) Methane and
(ii) Coke.
- (b) Discuss types of carbon nanotubes with respect to their structure. Give any *two* applications of CNT. [4]
- (c) Explain isotopes of carbon and hydrogen. Give *two* applications of each. [4]

Or

6. (a) Explain structure of fullerene with diagram and give its applications. [5]
- (b) Explain how H_2 gas is released from sodium alanates when used for H_2 storage. [4]
- (c) Explain how saline hydrides are formed. Give preparation and application of any *one* saline hydride. [4]
7. (a) Explain mechanism of wet corrosion by hydrogen evolution and oxygen absorption mechanism of electrochemical corrosion with suitable examples. [5]
- (b) What is galvanizing of iron ? Explain process of galvanization of iron with neat labelled diagram. [4]
- (c) Explain 'nature of oxide films' on metal surface and its effect on further corrosion. [4]

Or

8. (a) Explain any *five* factors affecting rate of corrosion. [5]
- (b) Give principle of cathodic protection of metal. Explain sacrificial anodic protection of metal. [4]
- (c) What is anodic coating and cathodic coating ? Which is preferred ? Why ? [4]