P-303

Seat No.	

Total No. of Pages : 4

First Year Engineering Examination, April - 2016
ENGINEERING CHEMISTRY
Sub. Code : 59183

Day and Date : Thursday, 21 -04 - 2016 **Total Marks : 100**
Time : 10.30 a.m. to 1.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Draw neat labelled diagram wherever necessary.**
3) **Figures to the right side indicate full marks.**

SECTION - I

Q1) a) A sample of water on analysis was found to contain the following impurities.

Salt	Amount in mg/lit.	Mol. Wt.
$Ca(HCO_3)_2$	29.1	162
$Mg(HCO_3)_2$	40.5	146
$CaCl_2$	11.5	111
$MgSO_4$	48.5	120
NaCl	28.5	58.5

Calculate temporary, permanent and total hardness of water sample.**[8]**

b) Solve any TWO of the following: **[10]**

i) What are the advantages and disadvantages of instrumental methods of analysis?

ii) What is Chloride content in water? Explain in detail.

iii) Explain properties and applications of GRP.

P.T.O.

Q2) a) Explain the principle, construction and working of glass electrode with suitable diagram. [6]

b) Solve any TWO of the following: [10]

i) What is scale and sludge formation? Explain disadvantages and preventation of scale formation.

ii) Give preparation properties and applications of Epoxy resin.

iii) What is a composite material? Explain the characteristics of composite materials.

Q3) Solve any FOUR of the following: [16]

a) Enlist the advantages and applications of gas chromatography.

b) Explain the addition and condensation polymerization reaction with suitable example.

c) Explain principle of ion exchange process for removal of hardness of water.

d) State and derive an equation for Beer's- Lambert's law.

e) What are the applications of nonmaterial's?

f) What is hardness of water? Explain in detail.

SECTION - II

Q4) a) A sample of coal has carbon 89% hydrogen 8.1% and ash 2.9%. Th following data were obtained when the coal was tested for calorific valu in Bomb calorimeter.

i) Weight of empty crucible = 11.0754 gm.

ii) Weight of crucible and coal sample = 11.8754 gm.

iii) Initial temp. of water = 28.4 °C,

iv) Final temp. of water = 34.1 °C,

v) Water equivalent of calorimeter = 973 gm.

vi) Weight of water taken = 2.693 Kg.

vii) Cooling correction = 0.07 °C

viii) Acid correction = 58.4 cal.

Calculate the higher and lower calorific values of the coal in Joule. [8

b) Attempt any two questions: [10]

i) Give composition and uses of Aluminum -based alloys.

ii) Define Chemical fuel. Give classification of Chemical fuel with examples.

iii) Discuss the material selection and design in controlling corrosion.

Q5) a) Explain hot dipping process with suitable diagrams to prevent corrosion. [6]

b) Solve any two of the following: [10]

i) Explain the construction and working of H_2-O_2 fuel cells. Give the half cell and net cell reactions take place in the fuel cell.

ii) Describe oxygen absorption mechanism in wet corrosion with suitable diagram.

iii) What are principles of green chemistry?

Q6) Answer of the following four questions: [16]

a) Write note on construction of Boy's gas Calorimeter.

b) Explain the factors related to surrounding environment influencing on the rate of Corrosion.

c) Compare between liquid fuel and gaseous fuel.

d) Give properties and uses of mild corbon steel.

e) Give advantages and disadvantages of metal spraying in controlling of corrosion.

f) State composition, properties and uses of Nichrome.