Total No. of Questions : 8]

SEAT No. :

P4419

[Total No. of Pages : 3

[5251]-1003

F.E. (Engineering) (Semester I & II)

ENGINEERING CHEMISTRY

(2015 Pattern)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates :

1) ***Neat diagram must be drawn wherever necessary.***
2) ***Figure to the right indicates full marks.***
3) ***Assume suitable data wherever necessary.***
4) ***Use of electronic pocket calculator is allowed (non-programmable).***

Q1) a) What are the different types of hardness in water? Give procedure,reactions and formulae for determination of hardness using EDTA method. **[6]**

b) Explain conductometric titration of strong acid with weak base using titration curve and reaction involved. **[3]**

c) What is Kolhraush's law? State its applications. **[3]**

OR

Q2) a) Explain the pH metric titration of mixture of H_3PO_4 and HCl against standard. NaOH, giving chemical reactions, procedure, titration curve and calculations. **[6]**

b) Define desalination of water. Explain reverse osmosis process for desalination of water **[3]**

c) Zeolite bed was exhausted by softening 4000 liters of water,which requires 10 liters of 15% NaCl solution for regeneration. Calculate the hardness of water sample. **[3]**

Q3) a) What is glass transition temperature? Discuss any four factors affecting it? State its importance. **[6]**

b) What is power alcohol? State its advantages and limitations. **[3]**

c) The following observations were noted in the Boy's gas calorimeter experiment - Volume of gas burnt at STP = $0.1m^3$, Mass of cooling water used = 25 kg, Rise in temperature of circulating water = 9.1°C mass of steam condensed = 0.04 kg. Find the GCV and NCV of the fuel. **[3]**

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OR

Q4) a) Draw neat labelled diagram and give construction, working of Bomb calorimeter to determine GCV of a fuel. State the formula of GCV with the corrections. **[6]**

b) Explain Solution polymerization technique with figure. Give its disadvantages. **[3]**

c) Distinguish between: **[3]**

Thermosetting and Thermosoftening Resins

Q5) a) What are carbon nanotubes? Explain types with respect to their structure. Give its applications. **[6]**

b) Write any four properties of hydrogen which make it difficult for storage and transportation. **[4]**

c) Explain the isotopes of hydrogen ? Give any two applications. **[3]**

OR

Q6) a) Explain production of hydrogen by steam reforming of methane and coke with reaction conditions and removal of CO_2. **[6]**

b) What are molecular hydrides? Give preparation reaction,properties and applications of Germane. **[4]**

c) What are saline hydrides? Give preparation reaction of sodium hydride with any two applications. **[3]**

Q7) a) State principle of electroplating. Discuss method with neat labelled diagram,reactions and applications. **[6]**

b) What is electrochemical or wet corrosion? Explain the mechanism of oxygen absorption. **[4]**

c) What is anodic and cathodic coating ? Which is more protective and why? **[3]**

OR

Q8) a) Explain the mechanism of dry corrosion. State the nature of oxide film formed in case of Na, Cu and Mo,along with chemical reactions. **[6]**

b) What are surface conversion coatings. Discuss any two methods in detail for applying these coatings. **[4]**

c) Discuss any three factors affecting rate of corrosion with respect to nature of metal. **[3]**