

Total No. of Questions : 8]

SEAT No. :

P4419

[Total No. of Pages : 3

[5251]-1003

F.E. (Engineering) (II Semester)

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 Kohlraush'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 = 0.1m³, 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]

P.T.O.

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]

