

Total No. of Questions : 6]

SEAT No. :

PE-12174

[Total No. of Pages : 4

[6581]-2405

F.E

BSC-103-BES : Engineering Chemistry
(2024 Pattern) (Semester - I/II)

Time : 2½ Hours]

[Max. Marks : 60

Instructions to the candidates :

- 1) All questions are compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 4) Assume suitable data, if necessary.

Q1) Multiple Choice Questions.

[10]

- i) Which of the following is an example of suspended impurities in water?
 - a) Dissolved Salt
 - b) Bacteria
 - c) CO_2
 - d) Clay and mud
- ii) The process of removing dissolved ionic impurities from water by passing a direct current using electrodes and ion selective membrane pairs is called as _____.
 - a) Osmosis
 - b) Electrodialysis
 - c) Reverse osmosis
 - d) Distillation
- iii) The resistance offered by a cube of unit length to the passage of electricity through it is called _____.
 - a) Specific resistance
 - b) Specific conductance
 - c) Resistance
 - d) Conductance
- iv) When absorption maxima of a compound shifts to longer wavelength, it is known as _____.
 - a) Bathochromic shift
 - b) Hyperchromic shift
 - c) Hypsochromic shift
 - d) Blue shift
- v) Polymers that do not become soft on heating and hard on cooling are _____.
 - a) Thermosetting polymer
 - b) Thermoplastic polymer
 - c) Thermo elastic polymer
 - d) Thermotropic polymer

P.T.O.

- vi) Applications of Quantum dots are _____
- Light emitting diode
 - Photo detectors
 - Biological analysis
 - All of these
- vii) Biodiesel is obtained from vegetable oil by process called as _____
- Oxidation
 - Reduction
 - Transestrification
 - Hydrogenation
- viii) Calorific value of gaseous fuel is determined by _____
- Boys gas calorimeter
 - Bomb calorimeter
 - Calorimeter
 - Junkers calorimeter
- ix) Example of anodic coating is _____
- Cu on Fe
 - Zn on Fe
 - Ag on Fe
 - Sn on Fe
- x) Electrolyte used for electroplating of copper on iron is _____
- NaOH
 - KOH
 - CuSO_4
 - ZnSO_4

Q2) Solve any 2 :

- Explain the zeolite process for water softening with a neat diagram. Give exchange and regeneration reactions and any two disadvantages. [5]
- Define scale. Explain any three causes of scale formation. List down any two disadvantages of scale formation. [5]
- A 50 ml water sample requires 12.6 ml of 0.02 M EDTA for the end point. The same volume of boiled water requires 7.3 ml of 0.02 M EDTA. Calculate the total hardness, permanent hardness and temporary hardness of the water sample. [3]
 - Define - Hard water and soft water. [2]
- A 25 ml water sample requires 5.4 ml of 0.025 N HCl up to phenolphthalein end point and 8.7 ml of 0.025 N HCl upto the methyl orange end point. Calculate the types and amount of alkalinity present in the water sample. [5]

Q3) Solve any 2 :

- Explain the construction of a calomel electrode with a neat labeled diagram and give its electrode representation and two disadvantages. [5]
- Describe any Four factor affecting conductance. Give any Two applications of conductometry. [5]
- Explain the various stages of pH metric titration of a strong acid with a strong base. Draw the titration curve and write the reaction involved. [5]
- Draw diagram of double beam UV - visible spectrophotometer and state the function of any three components of UV - visible spectrophotometer. [5]

Q4) Solve any 2 :

- What are conducting polymers? Explain the structural requirements of conducting polymer. Describe any one process of doping in polymer. [5]
- Give the preparation of polycarbonate. Write any three properties and three applications of polycarbonate. [5]
- Define Nanomaterial. Explain the classification of nanomaterials based on dimension. [5]
- Explain the structure of Grapheme with the help of neat diagram. Mention any two properties and any two applications of Grapheme. [5]

Q5) Solve any 2 :

- Explain the working of Bomb calorimeter with diagram for determination of GCV of solid fuel. Give the formula for GCV. [5]
- Write the chemical reactions involved in the production of Ethanol. State any Four advantages and any two disadvantages of power alcohol. [5]
- 1.50 gm of coal sample was heated in silica crucible at 110°C for 1 hour. The weight of the residue was 1.43 gm. The residue was then heated in a crucible covered with a vented lid for exactly 7 minutes at 950°C . The residue weighed 1.03 gm. The crucible was then heated without lid to a constant weight of 0.18 gm. Calculate % moisture, volatile matter, ash and fixed carbon. [5]
- 0.25 gm of coal sample on burning in a combustion chamber in a current of oxygen increased the weight of KOH u. tube by 0.69 gm and CaCl_2 u tube by 0.18 gm. Find % C and % H in coal.
The same coal sample in determination of sulphur gave precipitate of BaSO_4 weighing 0.12 gm calculate % S in coal. [5]

Q6) Solve any 2 :

- a) What is pilling Bedworth ratio? Give its significance. Give the chemical reaction and nature of oxide films formed due to oxygen on metals Na and Al. [5]
- b) What is the principle of cathodic protection? Explain Cathodic protection by the sacrificial anode with diagram for corrosion protection. Give its two applications. [5]
- c) What is wet corrosion? Explain the hydrogen evolution mechanism of wet corrosion with a neat labeled diagram. [5]
- d) Explain any five factors affecting the rate of corrosion. [5]

