

Total No. of Questions : 9]

SEAT No. :

P-3920

[Total No. of Pages : 4

[6001]-4003

F.E.

ENGINEERING CHEMISTRY

(2019 Pattern) (Semester - I/II) (107009)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Question No. 1 is compulsory.
- 2) Solve any one of Q.2 or Q3, Q4 or Q5, Q6 or Q7, Q8 or Q9.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6) Assume suitable data, if necessary.

Q1) Multiple Choice Questions :

- i) Electroluminescent polymers are used in : [1]
 - a) Solar cell technology
 - b) Digital display
 - c) LED
 - d) All of above
- ii) Properties of polymer composite depends on : [1]
 - a) colour of particle
 - b) monomer
 - c) size of particle
 - d) none of the above
- iii) Which of following industries have prominent applications for quantum dots? [1]
 - a) Electronic
 - b) Agriculture
 - c) Medical
 - d) None
- iv) In _____ λ_{\max} shift to higher side. [1]
 - a) hyperchromic effect
 - b) hypochromic effect
 - c) bathochromic shift
 - d) blue shift

P.T.O.

- Q3)** a) Explain with diagram the structure of graphene. Give three properties and three applications of it. [6]
- b) What is biodegradable polymer? Give three factors affecting biodegradation process of a polymer. Give any two applications of biodegradable polymer. [5]
- c) What are quantum dots? Give any two types of quantum dots. Write any two applications of Q.D.S. [4]

- Q4)** a) Explain steam reforming of coke and methane with reaction conditions for industrial production of hydrogen. Give process of CO₂ removal. [6]
- b) Explain fractional distillation process with diagram for petroleum crude. Give composition, boiling temperature range and use of any one fraction. [5]
- c) Exactly 2.500 gram was weighed into silica crucible. After heating for one hour at 110°C the residue weighed 2.415 gram. The crucible next was covered with vented lid and strongly heated for exactly seven minutes at 950 ± 20°C. The residue weighed 1.528 gram. The crucible was then heated without the cover, until a constant weight was obtained. The last residue was found to weight 0.245 gram. Calculate % moisture, % volatile matter, % ash and % Fixed carbon. [4]

OR

- Q5)** a) Give construction with figure and working of Bomb calorimeter. Write corrected formula to find out Gross calorific value of a coal using Bomb calorimeter. [6]
- b) What is 'Power Alcohol'? Give procedure for preparation of ethanol with reactions. Give any two advantages of Power alcohol. [5]
- c) Observations in the Boy's Gas calorimeter experiments are given below; find GCV and NCV of fuel. [4]

Volume of gas burnt at STP = 0.08m³

Mass of cooling water used = 29.5 kg

Rise in temperature of circulating water = 9.1°C

Mass of steam condensed = 0.04 kg

- Q6)** a) Explain with diagram the possible electronic transitions those may occur in organic molecule on absorption of UV-radiations. Also state forbidden electronic transitions. [6]
- b) Explain conditions for IR radiation absorption by organic molecule. Describe any three applications of IR spectroscopy. [5]
- c) Give statement and mathematical expression of Lambert-Beer's Law. [4]

OR

- Q7)** a) With the help of diagram explain construction of IR spectrometer. Describe different components of IR spectrometer. [6]
- b) Give any five applications of UV-visible spectroscopy. [5]
- c) Explain bending vibrations observed in IR spectroscopy. [4]
- Q8)** a) Explain hydrogen evolution and oxygen absorption mechanisms of wet corrosion with diagram and reactions. [6]
- b) Explain any five factors responsible for corrosion of metals. [5]
- c) What is galvanisation? Explain process with diagram. [4]

OR

- Q9)** a) Explain types of oxide films with corrosion reactions for metals, Na, Al, Ag, Mo. [6]
- b) Explain process of electroplating with the help of neat labeled diagram. Give any four applications of electroplating. [5]
- c) Distinguish between anodic and cathodic coatings. [4]

