

Total No. of Questions : 9]

SEAT No. :

PD4027

[6401]-1904

[Total No. of Pages : 4

F.E.

ENGINEERING CHEMISTRY

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Attempt 2 or 3, 4 or 5 6 or 7 & 8 or 9.
- 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:

[10]

- a) Poly Phenylene Vinylene (PPV) shows the property of.
 - i) Bioluminescence
 - ii) Luminescence
 - iii) Chemiluminescence
 - iv) Electroluminescence
- b) P-doping of conducting polymer is done by
 - i) I_2
 - ii) Na
 - iii) Li
 - iv) $SnCl_2$
- c) Nanomaterials are the materials in which size of particles ranges from
 - i) 1 nm - 100 nm
 - ii) 1 cm - 100 cm
 - iii) 1 mm - 100 mm
 - iv) 1 m - 100 m
- d) Catalyst used in shift reaction of H_2 production is
 - i) FeO
 - ii) Ni
 - iii) CH_3ONa
 - iv) None of these
- e) The relation between Gross and Net calorific value is
 - i) $GCV = NCV$
 - ii) $GCV > NCV$
 - iii) $GCV < NCV$
 - iv) None of these
- f) The detector used in UV-Visible spectrophotometer is
 - i) Phototube
 - ii) Photomultiplier tube
 - iii) Photovoltaic cell
 - iv) All of these

P.T.O.

- g) If absorption of molecule is shifted to wards longer wave length due to solvent effect is called as
- i) Hypsochromic shift ii) Hypochromic shift
 - iii) Bathochromic shift iv) Hyperchromic shift
- h) Bending vibrations are characterised by
- i) Change in bond angle between two covalent bonds
 - ii) Change in bond lenght between two covalent bonds
 - iii) Change in geometry of molecule
 - iv) No any change
- i) Galvanising is coating of
- i) Fe on Sn ii) Zn on Fe
 - iii) Sn on Fe iv) Fe on Zn
- j) Which type of reaction occur in anodic areas
- i) Oxidation ii) Reduction
 - iii) Displacement iv) Addition

Q2) a) What are Biodegradable polymers? Give the structure of PHBV. Explain three factors responsible for biodegradation. Give its any two applications. [6]

b) What are carbon nanotubes? Discuss the different types of carbon nanotubes with respect to their structure. Give any two applications. [5]

c) Give the structure, any two properties and two applications of polycarbonate. [4]

OR

Q3) a) Explain the structure of Graphene with the help of diagram and mention three properties and three applications. [6]

b) Define polymer composites. What is the role of matrix phase and disperse phase in composites. Give any two advantages. [5]

c) What are nanomaterials. Classify any three on the basis of dimensions. [4]

- Q4)** a) Give construction with figure, working and give corrected formula for finding gross calorific value of a solid fuel by Bomb calorimeter. [6]
 b) Give the preparation on reaction of Biodiesel. State three advantages of biodiesel. [5]
 c) 1.5 gm of coal sample in kjeldhal's experiment, librated ammonia which was absorbed in 25/ml 0.1N H_2SO_4 . The resultant solution required 14ml of 0.1N NaOH for complete neutralisation of H_2SO_4 . In back titration. The reading of blank titration was 25ml. Find the percent of nitrogen in coal. [4]

OR

- Q5)** a) Explain in brief the process with diagram for distillation of crude petroleum. Give composition, boiling range and uses of any two fractions obtained. [6]
 b) What is Power alcohol? Give any three merits and three demerits of power alcohol. [5]
 c) The following data was obtained in Boy's Jas calorimeter experiment. [4]
 i) Volume of gas burat at STP = $0.12m^3$
 ii) Mass of cooling water = 32kg
 iii) Rise in temperature of water = $7.8^\circ C$
 iv) Mass of steam condensed = 0.09kg
 Calculate GCV and NCV of the fuel

- Q6)** a) Draw the block diagram of IR spectrophotometer. Explain its four components and give their function. [6]
 b) Explain the possible electronic transitions that occure in the molecule after absorption of UV radiations with suitable examples and labelled diagram. [5]
 c) Explain any four applications of UV-Visible spectroscopy. [4]

OR

- Q7)** a) i) State and give mathematical expression of Beers and Lambert's law of absorption. [4]
 ii) Define- [2]
 1) Auxochrome
 2) Hypsochromic shift
 b) What are the conditions of IR radiations by the molecule? Explain the fundamental modes of streching vibrations. [5]
 c) Give the principle of IR spectroscopy. Calculate the fundamental modes of vibrations for the following molecules. [4]
 i) NO
 ii) H_2O
 iii) C_2H_6

- Q8)** a) State Pilling Bedworth ratio and give its significance. Give the different types of oxide films with suitable example formed during the oxidation corrosion of metals. [6]
- b) What is principle of cathodic protection? Explain the method involved using sacrificial anode and give its two applications. [5]
- c) What are anodic and cathodic coatings? Which one is more protective and why? [4]

OR

- Q9)** a) Explain the mechanism of wet corrosion by hydrogen evolution and oxygen absorption with diagram and reactions. [6]
- b) Explain any five factors affecting the rate of corrosion related to metal. [5]
- c) Define electroplating. Give the electroplating reactions with respect to the metals like Ag, Ni and Cr. [4]

