

Total No. of Questions : 9]

SEAT No. :

P-9068

[Total No. of Pages : 4

[6178]-3

E.E.

ENGINEERING CHEMISTRY

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Q. No. 1 is compulsory. Solve Q. No. 2 or Q. No. 3, Q. No. 4 or Q. No. 5, Q. No. 6 or Q. No. 7, Q. No. 8 or Q. No. 9.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- 5) Use of logarithmic tables slide rule, Mollier electronic pocket calculator and stem tables is allowed.

Q1) Multiple Choice Questions :

- a) Which of the following is used for p-doping in conducting polymers? [1]
 - i) Lithium
 - ii) Iodine
 - iii) Sodium
 - iv) Calcium
- b) Electroluminescent polymers are used in _____. [1]
 - i) LED
 - ii) Sutures
 - iii) Safety goggles
 - iv) Rechargeable batteries
- c) Which among the following is an example of quantum dots? [1]
 - i) Se
 - ii) K
 - iii) CdSe
 - iv) AsF₅
- d) Unit of calorific value for solid fuel is _____. [1]
 - i) Kcal/m³
 - ii) cal/g
 - iii) Joules
 - iv) J/m³
- e) The enzyme used for conversion of glucose to ethanol is _____. [1]
 - i) lactase
 - ii) maltase
 - iii) invertase
 - iv) zymase

P.T.O.

- Q4)** a) Discuss the construction and working of Bomb calorimeter with diagram for determination of GCV of fuel. State the formula (without corrections) to calculate GCV. [6]
- b) Give the preparation reaction of biodiesel. Give its four advantages and two disadvantages. [5]
- c) 1.2g of coal sample on complete combustion increased the weight of U-tube containing CaCl_2 by 0.7g and U-tube containing KOH by 2.5g. Calculate % C, % H in coal. [4]

OR

- Q5)** a) State the principle and explain the process of fractional distillation of petroleum with diagram. Give the composition, boiling range and application of any one fraction obtained. [6]
- b) Explain production of hydrogen by steam reforming of methane and coke with reaction conditions. [5]
- c) 1.0 g of coal sample was heated for 1 hr. at $105-110^\circ\text{C}$, weight of the residue obtained was 0.9 g. The crucible was then heated without lid till a constant weight of 0.15 g was obtained. In an another experiment, 1.0g of the same coal sample was taken in a crucible with a vented lid and heated at 925°C for 7 minutes. The weight of the residue was 0.55 g. Calculate % moisture, % volatile matter, % ash and % fixed carbon. [4]

- Q6)** a) What are the conditions of absorption of IR radiations by molecules? Explain the fundamental modes of bending vibrations. [6]
- b) Discuss any five applications of UV-vis spectroscopy. [5]
- c) Define: [4]
- | | |
|----------------------|-----------------|
| i) Hypochromic shift | ii) Chromophore |
| iii) Red shift | iv) Blue shift |

OR

- Q7)** a) Explain the different types of electronic transitions with diagram which occur on absorption of UV-vis radiations by an organic molecule. State the forbidden transitions. [6]
- b) Draw block diagram of IR spectrophotometer. Explain and give function of its four components. [5]
- c) Calculate fundamental modes of vibrations for - [4]
- | | |
|--------------------|-------------------|
| i) NO | ii) CH_4 |
| iii) NH_3 | iv) CO_2 |

- Q8)** a) Give the reaction involved and mention the type of oxide film formed on the oxidation corrosion of Na, Mg, Cr, Mo. [6]
- b) What is electroplating? Explain the process with diagram and reactions involved. Give any two applications of electroplating. [5]
- c) Define cathodic and anodic coatings. Which are better and why? [4]

OR

- Q9)** a) Explain hydrogen evolution and oxygen absorption mechanisms of wet corrosion. [6]
- b) Discuss any five factors w.r.t. nature of metal affecting rate of corrosion. [5]
- c) Give the principle of cathodic protection. Explain any one method of cathodic protection. [4]

