

Total No. of Questions : 9]

SEAT No. :

P6487

[Total No. of Pages : 4

[5868]-103

F.E. (Semester - I & II)
ENGINEERING CHEMISTRY
(2019 Pattern) (Paper - II) (107009)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) Multiple choice questions -

- i) PPV shows _____ fluorescence on application of electric field and can be used in _____ [2]
A) blue, sutures B) yellow-green, organic LEDs
C) red, eye-wear lenses D) violet, drug - delivery
- ii) C atoms in graphene show _____ hybridisation. [1]
A) sp^3 B) sp
C) sp^2 D) sp^3d^2
- iii) Power alcohol is advantageous because it _____ [1]
A) decreases octane number B) burns clean
C) increases calorific value D) increases cetane number
- iv) Units of calorific value are _____ [1]
A) Cal/g B) Cal/m
C) Joules D) Kg/m^3

P.T.O.

- v) CO_2 is _____ and shows _____ fundamental modes of vibration. [2]
A) linear, 3 B) non-linear, 3
C) linear, 4 D) non-linear, 4
- vi) Electromagnetic radiations with wavelength 10-400 nm are called _____ radiations. [1]
A) Visible B) Microwave
C) IR D) Ultra violet
- vii) Tinning is coating of _____. [1]
A) Fe on Sn B) Zn on Fe
C) Sn on Fe D) Fe on Zn
- viii) Rate of corrosion _____ with increase in purity of the metal. [1]
A) decreases
B) increases
C) remains same
D) initially increases and then remains constant

- Q2)** a) What are biodegradable polymers? Explain three factors responsible for biodegradation. Give two properties and two uses of biodegradable polymer. [6]
b) What are nanomaterials? Discuss in brief two properties and applications of nanomaterials. [5]
c) Give the structure and three properties and applications each of polycarbonate. [4]

OR

- Q3)** a) What are carbon nano-tubes? Discuss the different types of carbon nanotubes with respect to their structure. [6]
b) Explain the structure of graphene with the help of diagram and mention its two properties and two applications. [5]
c) What are conducting polymers? State the structural requirements for a polymer to be conducting and give any three applications of conducting polymers. [4]

Q4) a) What is proximate analysis of coal? Give the procedure and formula for determination of each constituent. [6]

b) Explain the production of hydrogen by steam reforming of coke and methane with reaction conditions. [5]

c) The following data was obtained in a Boy's gas

Calorimeter experiment -

Volume of gas burnt at STP = 0.1m^3

Mass of cooling water = 30 kg

Rise in temperature of cooling water = 8.1°C

Mass of steam condensed = 0.08 kg

Calculate GCV and NCV of the fuel [4]

OR

Q5) a) Give the principle and explain the process of fractional distillation of crude oil with labelled diagram. Give the composition and boiling range of any one fraction obtained during refining. [6]

b) Give the preparation reaction of biodiesel. State four advantages and two limitations of biodiesel. [5]

c) 1.0g of coal sample on complete combustion increased the weight of U-tube containing CaCl_2 by 0.5g and tube containing KOH by 2.4g. Calculate % of C and H in the given coal sample. [4]

Q6) a) Draw block diagram of IR spectrophotometer. Explain its any four components and give their function. [6]

b) Explain the possible transitions which occur on absorption of UV-Vis radiations by an organic molecule. [5]

c) Explain any four applications of IR spectroscopy. [4]

OR

Q7) a) Draw block diagram of single beam UV-vis spectrophotometer. Explain its four components and give their function. [6]

b) Give the principle of IR spectroscopy. Explain fundamental modes of bending vibrations. [5]

- c) Define the following terms - [4]
- i) Chromophore
 - ii) Hypsochromic shift
 - iii) Auxochrome
 - iv) Hypochromic shift

- Q8)** a) Explain hydrogen evolution and oxygen absorption mechanism of wet corrosion. [6]
- b) What is electroplating? Explain the process with diagram and reactions. Give applications of electroplating. [5]
- c) What are anodic and cathodic coatings? Which are better and why? [4]

OR

- Q9)** 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) Explain any five factors affecting the rate of corrosion. [5]
- c) What is the principle of cathodic protection? Explain any one method of cathodic protection. [4]

