Total No. of Questions : 9]

SEAT No. :

PE898

[Total No. of Pages : 3

[6581]-1904
F.E.
ENGINEERING CHEMISTRY
(2019 Pattern) (Credit System) (Semester - I/II) (107009)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Question 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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rules, Mollier charts, Use of scientific calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Multiple Choice Questions.

i) All the carbon atoms in Graphene are _____ hybridized. **[1]**

a) SP b) SP^2

c) SP^3 d) None of these

ii) PHBV a copolymer is an example of _____ polymer. **[1]**

a) Biodegradable b) Composite

c) Engg.Thermoplastic d) Liquid Crystal

iii) Reinforcing agent used in a polymer matrix _____ . **[1]**

a) Carbon fibre b) Glass fibre

c) Aramid fibre d) All of these

iv) Characteristics of a good fuel _____ . **[1]**

a) High calorific value b) Moderate ignition temp

c) Low Moisture content d) All of the above

v) Boy's calorimeter can be used to determine calorific value of _____ **[1]**

a) Solid fuel b) Volatile liq fuel

c) Gaseous fuel d) Both B & C

vi) Fundamental modes of vibration in C_6H_6 are _____ . **[1]**

a) 9 b) 6

c) 3 d) 30

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vii) Monochromator-prism in IR spectroscopy is made up of _____ . **[1]**

a) NaCl, KOH b) NaCl, KBr

c) NaOH, KBr d) NaOH, KOH

viii) According to Lamberts law, absorbance of the solution is proportional to _____ provided that _____ of solution remains constant. **[1]**

a) Conc and pathlength b) Pathlength and conc

c) Conc and pH d) Pathlength and pH

ix) Corrosion between the dissimilar metals is called _____ . **[1]**

a) Galvanic corrosion b) Dry corrosion

c) Oxidation corrosion d) Conc. cell corrosion

x) Copper forms _____ film. **[1]**

a) Non-porous b) Porous

c) Volatile d) Unstable

Q2) a) Define conducting polymer. What is the structural requirements for a polymer to show conductive property? Give doping reactions, two properties and two applications of conducting polymer. **[6]**

b) Define Nanomaterial. Explain classification of nanomaterial based on dimension with example. **[5]**

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

OR

Q3) a) What are Carbon Nano Tubes? Discuss the different types of CNTs with respect to their structure. Give any two applications. **[6]**

b) What is biodegradable polymer? Explain the favourable conditions for biodegradation 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 quantum dots. **[4]**

Q4) 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) What is Power Alcohol? Give the method of preparation with reactions involved of ethanol from molasses. State any two advantages of Power Alcohol. **[5]**

c) 1.1 g coal containing 7% H was combusted in a Bomb Calorimeter. The amount of water in the calorimeter was 1050g and water equivalent of the calorimeter = 200g. Rise in temp of surrounding water was 3.65ºC.
The corrections are as follows:
Acid correction = 55cal, Fuse wire correction = 15cal and cooling correction = 0.015ºC.
Calculate GCV and NCV of coal. **[4]**

OR

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Q5) a) Explain the production of hydrogen by steam reforming of methane and coke with reaction conditions and removal of CO_2. **[6]**

b) What is Biodiesel? Give preparation reaction of biodiesel with reaction conditions give advantages and limitations of biodiesel. **[5]**

c) 2.00g of coal sample was heated for one hour at 110ºc, the weight of the residue was 1.80g.The residue was then covered with a vented lid and heated for exactly 7 minutes at 950ºC. The residue weighed 1.00g. The crucible was then heated without lid till a constant weight of the residue of 0.15g was obtained. Calculate % of the various constituents of coal.**[4]**

Q6) a) Explain block diagram of single beam of UV-vis spectrophotometer. Explain its four components and give their function. **[6]**

b) What are the conditions of IR radiations by the molecule? Calculate the fundamental modes of vibrations in the following molecules **[5]**

i) H_2O
ii) NO

c) Define the following: **[4]**

i) Beers law
ii) Chromophore
iii) Auxochrome
iv) Bathochromic shift

OR

Q7) a) Give principle of IR spectroscopy. Explain modes of vibrations with stretching and bending vibrations. **[6]**

b) Explain the possible electronic transitions with diagram which occur on absorption of UV. vis radiations by an org. molecule. **[5]**

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

Q8) a) Define corrosion. State the conditions under which wet corrosion occurs. Explain hydrogen evolution mechanism of wet corrosion. **[6]**

b) What is the principle of cathodic protection? Explain any one method.**[5]**

c) Explain any four factors affecting the rate of corrosion related to metal.**[4]**

OR

Q9) a) Define Electroplating. Explain the process with diagram and reactions. Give any two applications of electroplating. **[6]**

b) What is PBR? Explain diff-types of films with related to nature of metal**[5]**

i) Mg
ii) Cu
iii) Ag
iv) Mo

c) Distinguish between Galvanisation and Tinning. **[4]**

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