Total No. of Questions : 8]

SEAT No. :

P548

[Total No. of Pages : 2

[4456] - 103
F.E. (Semester - I & II)
ENGINEERING CHEMISTRY
(2012 Course)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q. 2, Q.3 or Q. 4, Q.5 or Q. 6, Q.7 or Q. 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate 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) a) Explain formation of scales in boiler, give their disadvantages and methods of removal. **[6]**

b) Calculate potential on redox electrode dipped in titration mixture, when 20 ml of 0.1 N Ce^{4+} solution from the burette is added in 100 ml 0.1 N Fe^{2+} solution. Standard reduction potentials for $Fe^{3+} \dashrightarrow Fe^{2+}$ and $Ce^{4+} \rightarrow Ce^{3+}$ are 0.75 V and 1.45 V respectively. **[3]**

c) Explain the conductometric titration of KCl against $AgNO_3$ solution from burette. **[3]**

OR

Q2) a) Explain the principle, instrumentation and applications of UV-Visible spectrophotometer. **[6]**

b) State the problems in traditional synthesis route and advantages of green route in manufacture of adipic acid. **[3]**

c) A zeolite softner gets exhausted on softening 4000 litres of hard water. Calculate hardness of the water if the exhausted zeolite requires 10 litres of 10% NaCl solution for regeneration. **[3]**

Q3) a) i) Give structural change on vulcanization of natural rubber molecules with sulphur. How does it affect the strength? **[3]**

ii) State the purpose of compounding polymers with plasticizers and fillers. **[3]**

P.T.O.

b) i) Give the reaction involved in biodiesel formation and state any three advantages of biodiesel. **[3]**

ii) Calculate the amount of air (20% excess) required for complete combustion of 1kg wood if it contains 55% carbon, 8% hydrogen, 5% oxygen and remaining non combustible part. **[3]**

OR

Q4) a) i) Define biodegradation of polymers. State favourable structure of polymer for biodegradation. Write structure of biopol(PHBV). **[3]**

ii) Give any six differences in thermosoftening and thermosetting polymers. **[3]**

b) Give construction, working and calculation for finding gross calorific value of a solid fuel by Bomb calorimeter. **[6]**

Q5) a) Give industrial methods of manufacturing of hydrogen gas. **[5]**

b) Explain structure of diamond, give its properties and applications. **[5]**

c) Give preparation, reactions of saline hydrides. **[3]**

OR

Q6) a) State the difficulties in storage of hydrogen gas. Give its chemical storage in alanates and metal hydrides. **[5]**

b) Give preparation, reactions of silane. **[4]**

c) Give any one method of preparing carbon nanotubes. State applications of carbon nanotubes. **[4]**

Q7) a) Give the mechanism of electrochemical corrosion. **[5]**

b) Explain 'nature of metal' factors affecting rate of corrosion. **[5]**

c) What are types of metallic coatings? Which is prefered? Why? **[3]**

OR

Q8) a) Give principle, construction and applications of cathodic protection. **[5]**

b) Explain 'powder coating' method for corrosion control. **[4]**

c) Account on, 'nature of oxide films' on metal surface and its effect on further corrosion. **[4]**