TED(10)-1016 B Reg No.....

(REVISION-2010) Signature.....

SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING

TECHNOLOGY-OCTOBER, 2013

APPLIED SCIENCE-II (Chemistry)

(Common except DCP and CABM)

(Maximummarks:50) [*Time*:$1\frac{1}{2}$ hours]

PART-A

(Maximum marks:4) Marks

(Answer the following questions in one or two sentences. Each question carries 2 marks).

PART- A

I. a) Give the schematic representation of Daniel cell (commercial form). 2

b) With an example show that corrosion is an electro chemical process. 2

PART- B

(Answer any two full questions. Each question carries 8 mark)

II. a) What happens when charcoal is added to a mixture of moist gases taken in a closed vessel ? Explain the phenomenon. 4

b) With an example show that corrosion is an electrochemical process. 4

III. a) Compared with the compounds of other elements the number of organic compounds is very large. Why ? 4

b) Classify composite with examples. 4

IV. a) Explain the working of a hydrogen – oxygen fuel cell 4

b) Give the structure of Nylon – 6 and Nylon – 6,6 4

PART- C

(Answer one full question from each unit. Each question carried 15 marks)

UNIT-i

V. a) What are the effect of a surface area and temperature on adsorption ? 4

b) Mention any three application of adsorption in industry. 3

c) What are electro chemical series ? What are its applications ?

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d) Explain any two applications of electrolysis. 4

OR

VI. a)Distinguish between electroplating and anodizing with suitable example. 4

b) Explain the working of a secondary cell. 4

c) Classify different types of conductors. 4

d) Arrange the following as weak , strong and non – electrolytes. H_2SO_4 , Urea , Oxalic acid , KOH , Alcohol and NH_4OH. 3

VII. a) Based on the synthesis how will you classify polymers. Illustrate with examples. 4

b) What happens when refined petroleum is fractionally distilled ? 4

c) What is petrochemical smog ? Mention its harmful effects. 4

d) Briefly discuss green chemistry. 3

OR

VIII. a) Describe Cottrell smoke percepitator. 4

b) Explain the following : 1) CNG 2) BOD 4

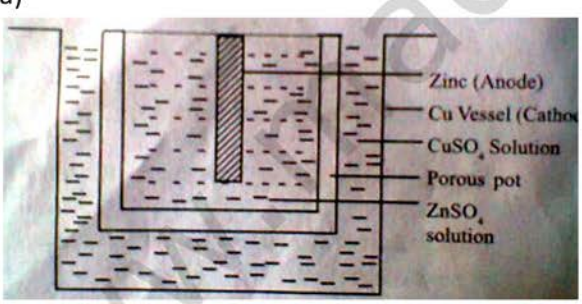
c) Distinguish between saturated and unsaturated organic compounds. 4

d) What are the hazards of radioactive pollution ? 3

ANSWERS

PART-A

I. a)



b) Isoprene is the monomer of natural rubber. Chloroprere is the monomer of neoprene (Synthetic rubber)

PART-B

II. a) Charcoal adsorb moister. Adsorption is the process of accumulation of gas molecules on the surface of adsorbent.

b) **Saturated organic compounds**

- Contain single covalent bonding
- Are less reactive

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- Do not decolurise bromine water and Baeyer's reagent
  Eg : Propane ,Butane

Unsaturated organic compounds

- Contain multiple covalent bonding
- Are more reactive
- Decolurise bromine water and Baeyer's reagent
  Eg : Propene ,Butene

III.

a) It is the following properties of carbon.

1) **Isomerism :** Same molecular formula different properties
2) **Catenation property :** Self linking property of carbon
3) Te**tra Covalency:** Sharing of four valence electrons
4) **Possibility to form multiple bonds :** Double bond and triple bond

Strength of C-C bond : C-C bond is stronger than other bond

b) Composites are reinforced plastics. It consists of a matrix phase and dispersed phase.

3 types composites are

- Fibre reinforced composite → Fibre is embedded in suitable material
  Eg: Glass Reinforced Plastic(GRP)
- Particulate composite → particles of different size dispersed in material
  Eg : Concrete
- Dispersion hardened composite → Fibre particles dispersed in material
  Eg : Alloys of copper

IV.

a) At anode (oxidation):

$$2H_2 + 4OH^- \rightarrow 4H_2O + 4e^-$$

At cathode (Reduction):

$$O_2 + 2H_2O + 4e^- \rightarrow 4\ OH^-$$

Advantages:

- Pollution free
- Light and compact
- Very high efficiency (75%)

b) Nylon-6 : $[\ -CO-(CH_2)_5-NH-\ ]_n$

Nylon-6,6 : $[\ -NH-(CH_2)_6 - NH - CO\ (CH_2)_4 - CO -]_n$

PART –C

UNIT-i

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VI a) When surface area increases adsorption increases. So powdered from have more adsorbing capacity. When temperature increases adsorption decreases because adsorption is exothermic.

b) 1) Aqueous solution of raw sugar(brown in colour) become colourless when passed through animal charcoal

2) To produce high vacuum using activated charcoal

3) Softening of hard water using ion exchange method

c) It is the arrangement of elements in the increasing order of their reduction potential.

Application

- higher elements displaces lower elements
- Higher element will be anode and lower element will be cathode.
- Metals above hydrogen give hydrogen gas with acids.

d) Electroplating : the process of coating a base metal with a superior metal.

Eg ; Gold plating

Anodising: The process of uniform coating of an oxide layer on metal surface.

Eg ; Oxide layer on Al or Zn

OR

V. a)

Electroplating	Anodising
• Superior metal is coated	• A uniform Oxide layer is coated on metal surface.
• Base metal is taken as cathode	• Base Metal is taken as anode
• Electrolyte is the solution of superior metal	• Electrolyte is oxidising acid like dilute H_2SO_4 or Chromic acid
• Electroplating of steel spoon with nickel	• Eg : Oxide coating on Aluminium

b) At anode : (oxidation)

$$Cd + 2\,(OH)^- \rightarrow Cd\,(OH)_2 + 2e^-$$

At cathode : (reduction)

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$$NiO_2 + 2H_2O + 2e^- \rightarrow Ni(OH)_2 + 2(OH)^-$$

Cell representation : Cd / CdO // NiO_2 / Ni

c) Four type of conductors are :

Metallic conductor :

Eg: Metal and alloys, conduction by electrons

Electrolytic conductor:

Eg; Molten NaCl, conduction by ions

Semi conductor :

Eg : Ge or Si

Super conductor:

Eg : Hg at low temperature

d) Strong electrolyte : H_2SO_4 , KOH

Weak electrolyte : Oxalic acid , NH_4OH , Urea.

Non electrolyte : Alcohol

VI.

VIII) a) Two types of polymerization are:

1) Additional polymerization : They are formed by repeated addition of monomers without elimination. They are formed by unsaturated compounds. It is also called chain polymerization

Eg : Teflon , Polythene , PVC

2) Condensation polymerization : They are formed by addition of monomers along with elimination small molecule like H_2O ,NH_3. Their monomers contain two or more functional group. It is also called step growth polymerization.

Eg: Polyester , Bakelite , Nylon-6,6

b) On fractional distillation , we get Petrol , Diesel , Kerosene , Naphtha like components. They can be separated.

c) **Smog:**

Combination of smoke & fog suspended in air

ie smoke + fog.= Smog There are two types

Photochemical smog (Oxidising Smog):- unsaturated hydrocarbons + nitrogen oxides (in presence of Sun light) –> Photochemical smog . occurs in warm, dry and sunny climate . *Ex:* formaldehyde, peroxyacetyl nitrate (PAN)] .

Effects of photochemical smog:

1) Irritate the nose and throat 2) causes headache, chest pain, and dryness of the throat, cough and difficulty in breathing.3) leads to cracking of rubber and extensive damage to plant life. 4) Causes corrosion of metals, stones, building materials, rubber and painted surfaces

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d)) it is the development and implementation of chemical products and process that reduces pollution and hazard.

- It reduces production of chemical waste.
- Use of liquid CO_2 instead of 'cancer causing ' Chemical for dry cleaning.
- Use of H_2O_2 for bleaching clothes and paper instead of toxic chorine.

OR

VII. a) Cottrell smoke Preceiplator is used to remove smoke in air by passing through a chamber of high potential containing metal rod. Smoke deposite on the rod and air comes out.

b) 1) **CNG :** It is the compressed Natural Gas. It consist of mainly methane. It is used in automobiles.

2) **BOD:** It is the Biological Oxygen Demand. It measure the degree of pollution of water by organic matter.

c) **Saturated organic compounds**

- Contain single covalent bonding
- Are less reactive
- Do not decolurise bromine water and Baeyer's reagent

Eg : Propane ,Butane

Unsaturated organic compounds

- Contain multiple covalent bonding
- Are more reactive
- Decolurise bromine water and Baeyer's reagent

Eg : Propene ,Butene

d) Radio active pollution is due to cosmic rays , preparation of radio isotopes and radio active wastes. They mainly cause cancer and genetic disorder, defective eye sight.

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