

TED(10)-1016 B

Reg No.....

(REVISION-2010)

Signature.....

SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING

TECHNOLOGY-MARCH, 2012

**APPLIED SCIENCE-II (Chemistry)**

(Common except DCP and CABM)

(Maximummarks:50)

[Time:1<sup>1</sup>/<sub>2</sub> hours]

**PART-A**

(Maximum marks:4)

Marks

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

I. Give reason and explain the following observations:

- |  |   |
|--|---|
| 1) Aqueous solution of raw sugar becomes colour less when passed over animal charcoal. | 2 |
| 2) Air becomes dry in presence of silica gel?  | 2 |

**PART-B**

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

II. a)

- |   |   |
|---|---|
| 1) Which one is a better oxidizing agent?                   |   |
| 2) Which metal displaces the other metal from its solution? | 4 |

b)

- |  |  |
|--|--|
| 1) What is the effect of temperature on electric conduction on metallic and electrolytic conductors? |  |
| 2) Rate of corrosion is more near to seashore area. Explain your reason?                             |  |

III.

- |   |   |
|---|---|
| a) How will you represent Daniel cell? Write the electrode reactions and cell reactions ? | 4 |
| b) What is London smog? What are the environmental impact of photochemical smog ?         | 4 |

IV. a) Identify the functional group in the following molecules :

- 1)  $\text{CH}_3\text{COOCH}_3$  ,  $\text{CH}_3\text{OCH}_3$

- 2) Write the possible isomers of  $C_4H_{10}$  4
- b) Illustrate with two examples:
- 1) Saturated and unsaturated hydrocarbons.
  - 2) Condensation polymerization 4

## PART-C

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

### UNIT-i

- V. a) Physisorption can be changed to Chemisorption. Illustrate with examples? 4
- b)
- 1) Explain the electrochemical theory of corrosion ?
  - 2) Galvanization 4
- c) Write down the cell reaction Ni-Cd. How do represent it ? 4
- d) Sketch  $H_2-O_2$  fuel cell and cell reaction involved in it. 4

### OR

- VI. a) Explain the electrolysis of molten NaCl ? 4
- b) How are electrochemical cell classified and compare them with examples? 4
- c) What are different types of barrier protections? 4
- d) Which part of the iron corrodes if it partially immersed in an electrolyte?  
Give reasons? 3

### UNIT-ii

- VII. a)
- 1) How you distinguish between saturated and unsaturated hydrocarbon?
  - 2) Give two examples of nuclear fuels? 4
- b)
- 1) Mention the process used to improve the properties of rubber ?
  - 2) What are the monomers in Buna-S and Buna-N ? 4
- c) High boiling gasoline fractions are not good fuels. Suggest a suitable process to convert them into good fuels? 4
- d) How does ozone layer depletion happens ? 4

OR

- VIII. a) What are different type polymerizations ? 4  
b) What are the difference between thermoplastic and thermosetting plastic? 4  
c) What is mean by propellants ? How are they classified? 4  
d) How does rain becomes acid rain? 3

## ANSWERS

### PART-A

- I. 1) Adsorption. The colour of raw sugar is adsorbed by animal charcoal.  
2) Adsorption, Silica gel adsorbs water moisture.

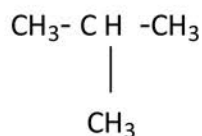
### PART-B

- II. a) Gives  $Zn = -0.76 V$   
 $Ag = +0.80 V$   
1) Ag is better oxidising agent  
2) Higher element in series displaces lower element . So Zink displace Ag  
b) 1) Metallic conductance decreases with rise in temperature. Electrolytic conductance increases with rise in temperature.  
2) In seashore area the formation of electrochemical cell is more easier due to presence of ions in air. So corrosion will be higher.
- III. a) Cell representation  $Zn / Zn^{2+} // Cu^{2+} / Cu$   
At anode :  $Zn \rightarrow Zn^{2+} + 2e^-$  (oxidation)  
At cathode :  $Cu^{2+} + 2e^- \rightarrow Cu$  (reduction)  
Cell reaction :  $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$

b) It is the mixture of smoke and fog containing oxides of sulphur ( $SO_2$  and  $SO_3$ ). The harmful effects are

- Irritation of eyes, nose
- Problems of respiratory tract.
- Damage to plant growth , Vegetation.

- IV. a) (1)  $-COO-$  (ester)  $-O-$  (ether)  
(2)  $C_4H_{10}$   $CH_3-CH_2-CH_2-CH_3$



b) **Saturated organic compounds**

- Contain single covalent bonding
  - Are less reactive
  - Do not decolorise bromine water and Baeyer's reagent
- Eg : Propane , Butane

**Unsaturated organic compounds**

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

(2) Condensation polymers are formed from compounds with different functional groups. Small molecules like  $\text{H}_2\text{O}$  ,  $\text{HCl}$  are eliminated along addition.

Eg: Nylon-6,6 , Polyester

## PART-C

### UNIT-i

V. a) Physisorption take places at low temperature. By Increasing temperature it may change to Chemisorption.

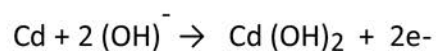
Eg: Hydrogen molecule adsorb on nickel at low temperature by Physisorption.

But at high temperature it dissociates to hydrogen atoms and held on surface by chemisorption.

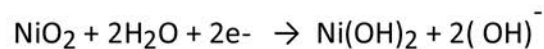
b) During corrosion an electrochemical cell is formed between the dissimilar parts of the same metal. The metal ion formed at anodic area and hydroxide ion from cathodic area combine to form corrosion product.

(2) Galvanization is the process of coating Zink on the surface of iron.

c) At anode : (oxidation )

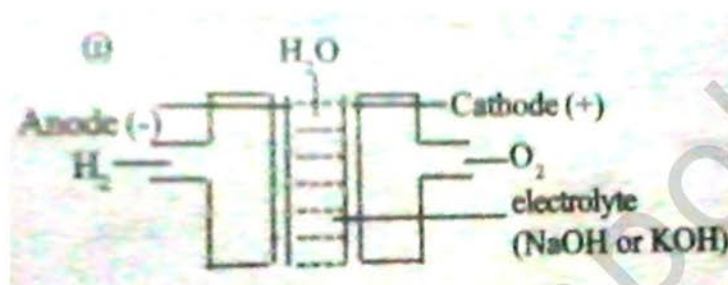


At cathode : (reduction)



Cell representation :  $\text{Cd} / \text{CdO} // \text{NiO}_2 / \text{Ni}$

d) (i)

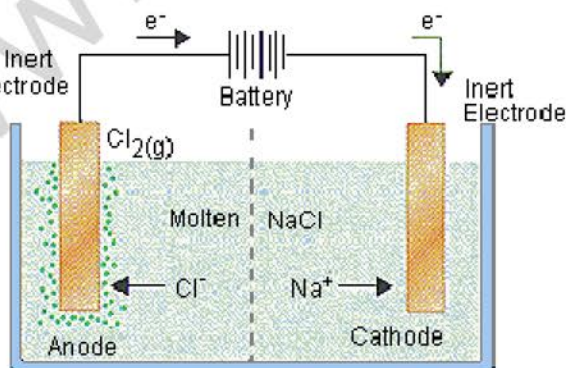


Cell reaction :  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{energy}$

OR

VI

a) **Electrolysis of Molten NaCl:**



On passing current, NaCl decomposes as  $\text{NaCl} \rightarrow \text{Na}^+ + \text{Cl}^-$

At Anode (Oxidation):  $\text{Cl}^- - 1\text{e}^- \rightarrow \frac{1}{2} \text{Cl}_2$

At Cathode (Reduction):  $\text{Na}^+ + 1\text{e} \rightarrow \text{Na}$

b)

Primary cell	Secondary cell
<ul style="list-style-type: none"><li>▪ Redox reaction take place only once</li><li>▪ Reaction are not reversible</li><li>▪ Not rechargeable</li><li>▪ Eg :Dry cell, Daniel cell</li></ul>	<ul style="list-style-type: none"><li>▪ Redox reaction take place again</li><li>▪ Reactions are reversible</li><li>▪ Rechargeable</li><li>▪ Eg : Lead storage battery, Ni-Cad Cell</li></ul>

c) The barrier protection method are

- Metallic coating
- Non - Metallic coating
- Organic coating

**Metallic coating :** Either more active or less active metal is coated. Galvanization is an example for it.

**Non – Metallic coating :** In this alkaline phosphate or alkaline chromate layer is coated on metal like Al or Zn

**Organic coating :** It is given to ships and submarines which are exposed to sea water. Plastic , paint, polythene or rubber are used as organic coating .

d) The part immersed in electrolyte undergoes corrosion faster.

## UNIT-ii

VII)

a) (i) **Saturated organic compounds**

- Contain single covalent bonding
  - Are less reactive
  - Do not decolourise bromine water and Baeyer's reagent
- Eg : Propane ,Butane

**Unsaturated organic compounds**

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

(2) Uranium -235 , Plutonium -239

b) (1) Vulcanisation : It is the process of heating natural rubber with sulphur or sulphur compound at a temperature of 110- 140<sup>o</sup> C

(2) Buna – S → Butadiene and Styrene

Buna – N → Butadiene and Vinyl cyanide.

c) (i) Cracking

(ii) It is the process of increasing the yield of gasoline from crude oil by splitting high boiling fraction to low boiling fractions.

Eg : Decane → Heptane + Propane

d) Ozone layer depletion is due to the freons and oxides of nitrogen. They are decomposed by UV radiation to form free radical that breaks ozone layer.

**OR**

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<sub>2</sub>O , NH<sub>3</sub>. Their monomers contain two or more functional group. It is also called step growth polymerization.

Eg: Polyester , Bakelite , Nylon-6,6

b)

Thermo plastic	Thermosetting plastic
<ul style="list-style-type: none"><li>• They formed by addition polymerization.</li><li>• They are reusable</li><li>• They have physical change</li><li>• Eg: Polythene , PVC</li></ul>	<ul style="list-style-type: none"><li>• Formed by condensation polymerization</li><li>• They are not reusable</li><li>• They have chemical change.</li><li>• Eg; Polyester, Bakelite</li></ul>

c) The fuels used in rockets for their propulsion are called propellants. They consist of fuel and oxidizer. They are classified as

- Solid propellants
- Hybride propellants
- Liquid propellants

d) Rain becomes acid rain due to the presence of oxides of nitrogen and sulphure which are highly soluble in water to form  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$