

TED(10)-1016 A

Reg No.....

(REVISION-2010)

Signature.....

SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING

TECHNOLOGY-MARCH, 2011

APPLIED SCIENCE-II (Chemistry)

(Common except DCP and CABM)

(Maximummarks:50)

[Time:1¹/₂ hours]

PART-A

(Maximum marks:4)

Marks

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

- | | | |
|----|---|---|
| I. | a) Which cells are used in appolo space programme ? | 2 |
| | What was the product used for ? | |
| | b) Name the acid present in acid rain ? | 2 |

PART-B

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

- | | | |
|------|--|---------------|
| II. | a) Explain the following the phenomena with an example | |
| | i) Sorption | ii) Occlusion |
| | 4 | |
| | b) i) How can you test whether the given electrolyte is a strong or weak electrolyte ? | 2 |
| | ii) What is the effect of temperature on the electrical conduction of metallic and electrolytic conductor? | 2 |
| III. | a) Represent a Daniel cell. Write the electrode reactions and net cell reaction taking place in it ? | 4 |
| | b) (i) Rain water normally have a pH of a about 5.6 when does it become acid rain ? | 4 |
| | ii) Why is acid rain considered as threat to Taj Mahal ? | 4 |
| IV. | a) Classify plastic based on the method of application and moulding . | |

- list their differences with two examples ? 4
- b) Illustrate with two examples:
- (i) saturated and unsaturated organic compounds.? 4
- (ii) Isomerism 4

PART-C

(Answer one full question from each unit. Each carries 15 mark)

UNIT-i

- V. a) Compare the characteristics of physisorption and chemisorptions 4
- b) Rusting of iron is an electrochemical corrosion :
- (i) Give the theory of electrochemical corrosion
- (ii) what is the final product formed after the corrosion of iron ?
- (iii) Coating of Zink or Tin is preferred to control the corrosion of Iron.
Give reason.? 4
- c) Fuel cells are alternate source of energy in future:
- (i) Sketch a H_2-O_2 fuel cell and the parts 4
- (ii) List any four advantages of fuel cells. 4
- d) Copper is conducting as such while copper sulphate is conducting only in molten state or in aqueous solution.Explain ? 3

OR

- VI. a) An electrochemical cell is madeup of zink and cobalt their standard reduction potentials $-0.76 V$ and $-0.28 V$ respectively:
- (i) Select the anode and catode
- (ii) Write the cell reactions
- (iii) Compare the e.m.f of the cell 4
- b) How are electrochemical cells classified and compare their features with one example each ? 4
- c) What are antirust solution and how does it help to reduce corrosion ? 4
- d) What do you understand by activation of adsorbent .and how is it achieved. 4

UNIT-ii

- VII (a) Give an example each for 1 i
- (i) Alicyclic hydrocarbon. "
- (ii) Benzanoid aromatic compound.
- (iii) Hetero cyclic compound
- (iv) Branched chain hydro carbon. 4
- b) Define the term 'fibre'. How are the classified ? give one example for each catogary 4
- c) High boiling gasoline fractions are not generally used as a fuel? 4

- (i) suggest a remedy for this.
(ii) Explain the process with a suitable example 4

- (d) . Why does green house effect lead to the global warming ?
What could be the consequences of global warming ? 3

OR

- VIII a) Organic compound are classified based on the functional groups
(i) What are functional groups ?
(ii) Which are the functional groups in aldehydes, Ketones, amines, ethers ? 4
- (b) What is natural rubber? How does vulcanization changes the character of natural rubber ? 4
- (c) How are fuels classified based on their occurrence and give two examples each ? 4
- d) List three techniques generally used in green chemistry to reduce environmental pollution . 3

ANSWERS

PART-A

- I. a) $\text{H}_2\text{-O}_2$ fuel cell. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{Energy}$
b) HNO_3 , H_2SO_4

PART-B

- II. a) (i) **Sorption** : Both adsorption and absorption take place simultaneously.
Eg; Chalk dipped in ink solution.
(ii) **Oclusion**: Adsorption of gas on metals
Eg; N_2 and H_2 gas adsorb on Fe
- b) (i) Strong electrolyte have large number of ions. So high conductivity.
Eg: HCl , HNO_3 , NaOH
Weak electrolyte have small number of ions .So low conductivity.
Eg: CH_3COOH , NH_4OH
(ii) when temperature increases metallic conductance
Decreases. When temperature increases electrolytic conductance increases.
- III. a) $\text{Zn}/\text{Zn}^{2+} // \text{Cu}^{2+} / \text{Cu}$
at anode : $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$
At cathode: $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$
Net reaction: $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$
- b) (i) When pH becomes less than 5.6 ($\text{pH} < 5.6$)
(ii) Taj Mahal is made up of marble (CaCO_3) which react with acid rain. So chemical change take place.
- IV. a) Two types : 1) Thermo plastic 2) Thermosetting plastic

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

b) (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

(ii) It is the phenomenon of having same molecular formula but different properties

Eg : C_2H_6O : CH_3-O-CH_3

CH_3-CH_2-OH

C_3H_8O : $CH_3-CH_2-CH_2-OH$

$CH_3-O-CH_2-CH_3$

PART-C

V. a)

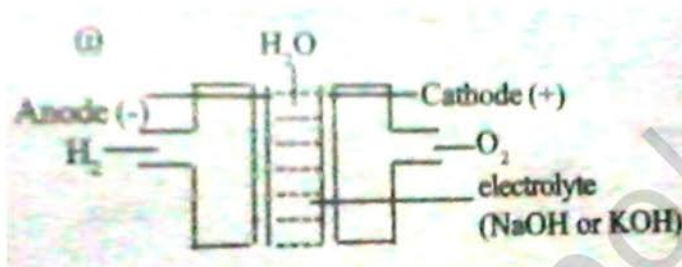
Physisorption	Chemisorption
<ul style="list-style-type: none"> • It is reversible • It is not specific • Multilayer adsorption • Weak Van derwaal attraction • No activation energy needed 	<ul style="list-style-type: none"> • It is irreversible • It is specific • Unilayer adsorption • Strong chemical bond • Activation energy needed

b) (i) 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.

(ii) Fe(OH)_3 OR $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$

(iii) Because Zinc is more reactive, it acts as anode. Less reactive Iron acts as cathode and gets protected, Eg: Galvanisation. In the case of Tin coating, less reactive metal Tin protects more reactive Iron from direct contact with atmosphere and thus prevents corrosion

c) (i)



(ii)

- More efficiency(75%)
- Free from pollution
- Continues energy supply
- Light weight and compact

d) Copper is a metal and it is a metallic conductor due to presence of free electrons. But CuSO_4 is salt. The CuSO_4 conducts only in molten or aqueous solution, then only the movement of ions take place.

OR

VI. a) Given $E^0 \text{Zn} = -0.76 \text{ V}$

$E^0 \text{Co} = -0.28 \text{ V}$

(i) Anode is Zn (Higher in series)

Cathode is Co (Lower in series)

(ii) At anode : $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$ (Oxidation)

At cathode : $\text{Co}^{2+} + 2\text{e}^- \rightarrow \text{Co}$ (Reduction)

(iii) $\text{emf} = E^0_{\text{cathode}} - E^0_{\text{anode}}$

$$= -0.28 - (-0.76) = 0.48 \text{ V}$$

b)

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

c) Anti rust solution are chemicals used ti protect metal from corrosion. In this method alkaline phosphate or alkaline chromate is coated on metal like Zink or iron. It is mainly used as a primer coat for paint .

d) Activation of adsorbent is the process of increasing adsorbing capacity of adsorbent. It done by

- Making surface rough
- Making adsorbent powdered form
- Removing already adsorbed substance

VII. a) (i) **Alicyclic hydrocarbon** : Cyclopropane, Cyclobutane

(ii) **Benezanoid aromatic**: Naphthalene, Phenole

(iii) **Hetrocyclic compound** : Furan , Thiophene

(iv) **Branched chain hydro carbon** : Isobutane, Isopentane

b) Fiber is defined as flexible macroscopically homogeneous body of high tensile strength with small cross section area.

Fiber is classified as

1) **Natural fiber** : Obtain from nature

Eg : Cotton, jute, silk

2) **Semi synthetic** : nature fibers treated with chemicals

Eg: Rayon

3) **Synthetic fiber** : They are man made

Eg: Nylon, Orlon

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 : Deacane → Heptane + Propane

d) As result of green house gasCO₂ absorb infra red radiation, the temperature of increases and lead to global warming .

Consequences are

- Melting of polar ice and rise in sea water level.
- Temperature increases. So summer will be longer and hotter
- Change in climate and growth of plants reduce.

VIII. a) (i) Functional groups are atoms or groups that determine the properties of an organic compounds.

(ii) Aldehyde [**-CHO**]

Ketone [**-CO-**]

Amine [**-NH₂-**]

Ether [**-O-**]

b) Natural rubber is an elastic material obtained from sap of rubber tree.

Isoprene is on polymerization gives rubber polymer. During vulcanization sulphur combines chemically at the double bonds of rubber. So act as a bridge or cross link between different rubber chains and strengthens.

c) **Primary fuel** : Eg : Wood , Petroleum

Secondary fuel : Eg: Petrol , Diesel

d)

- using liquid CO₂ along detergent for dry cleaning.
- Prevention of production of waste instead of treating the waste.
- Synthetic methods designed to maximize final product only
- Using H₂O₂ for bleaching clothes, paper instead of chlorine.