

TED(10)-1016 B

Reg No.....

(REVISION-2010)

Signature.....

SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING

TECHNOLOGY-OCTOBER, 2012

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).

PART- A

- | | | |
|----|----------------------------------|---|
| I. | a) Define the term Vulcanisation | 2 |
| | b) What is anodising ? | 2 |

PART- B

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

- | | | |
|------|--|---|
| II. | a) What are the factors that affect adsorption ? | 4 |
| | b) Write the chemical reaction take place in H ₂ -O ₂ fuel cell and give the advantages of H ₂ -O ₂ fuel cells | 4 |
| III. | a) Explain the theory of electrochemical corrosion ? | 4 |
| | b) What are the difference between thermoplastic and thermosetting plastic? | 4 |
| IV. | a) Explain about the uniqueness of carbon. | 4 |
| | b) Suggest remedial measures in order to reduce green house effect. | 4 |

PART- C

UNIT-I

- | | | |
|----|--|---|
| V. | a) How will you distinguish between physical adsorption and chemical adsorption. | 4 |
| | b) Explain the mechanism of electrolysis by taking molten NaCl as an example. | 4 |
| | c) Explain the following : | |

- 1) Galvanic corrosion 2) Differential aeration corrosion 4
d) What are primary and secondary cell? Discuss one example of each. 3

OR

- VI.** a) list the important application of adsorption 4
b) (1) Why does the blue color of copper sulphate solution get discharged when iron is dipped into it ?

(2) calculate the EMF of the cell given :

$$E^0 \text{Cu}^{2+} / \text{Cu} = +0.34 \text{ V}, \quad E^0 \text{Fe}^{2+} / \text{Fe} = -0.44 \text{ V} \quad 4$$

- c) Explain cathodic protection and Barrier protection method in order to prevent corrosion . 4
d) What are the difference between metallic conduction and electrolytic conduction? 3

UNIT-II

- VII.** a) Define the following terms :
(1) Functional group (2) Isomerism 3
b) What are Homo polymer and Copolymer and give two example each? 4
c) What are the qualities of a good fuel? 4
d) Explain the following :
(1) Green house effect (2) Acid rain 4

OR

- VIII.** a) Difference between saturated and unsaturated compounds ? 4
b) Define the term composite. Explain the different types of composites? 4
c) Write the monomers of the following polymers:
(1) Buna-S (2) Neoprene
(3) Teflon (4) Nylone-6 4
d) What is Green Chemistry? Explain the scope of Green chemistry in the present world? 3

ANSWERS

PART-A

- I. a) Vulcanisation is the process of heating natural rubber with sulphur compound at $110 - 140^{\circ}$
b) Anodising is the process of coating a metal like Al or Mg with a uniform oxide film.

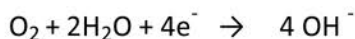
PART-B

- II. a) 1) Nature of gas being adsorbed
2) Temperature
3) Pressure
4) Surface area of adsorbent
5) Activation of adsorbent

b) At anode (oxidation):



At cathode (Reduction):



Advantages:

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

III.

a) 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.

b)

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

IV.

a) It is the following properties of carbon.

- 1) **Isomerism** : Same molecular formula different properties
- 2) **Catenation property** : Self linking property of carbon
- 3) **Tetra 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) Minimise the use of automobiles

Planting more trees

Reduce the presence of CO₂ in air

PART-C

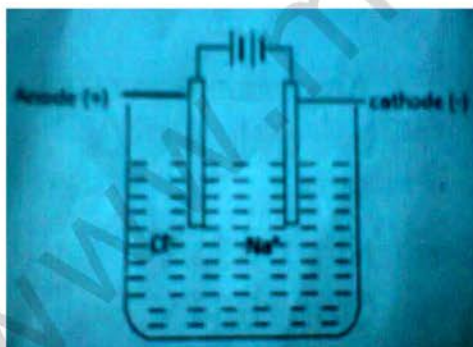
UNIT-i

v)

a)

Physisorption	Chemisorption
<ul style="list-style-type: none"> • It is reversible • It is not specific • Multilayer adsorption • Weak Van der Waals 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) Electrolysis is the decomposition of an electrolyte by passage of electricity. When electricity passed through molten NaCl, it will dissociate to Na⁺ and Cl⁻ ions and move toward cathode (-) and anode (+) respectively.



At cathode : $\text{Cl}^- - 1e^- \rightarrow \text{Cl}$ (oxidation)

At anode : $\text{Na}^+ + 1e^- \rightarrow \text{Na}$ (reduction)

c) (1) When two dissimilar metals are electrically connected and exposed to an electrolyte, the metal having higher position in electrochemical series undergoes oxidation and corrosion.

(2) When a metal is in two different atmospheres, one having higher oxygen concentration, it acts as a cathode; another having lower oxygen concentration, it acts as an anode. Corrosion takes place at the anode.

d)

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

OR

V. a) (1) Adsorption is used for conversion of hard water into soft by ion-exchange resin method.

(2) Coconut charcoal is used for adsorption of poisonous gas.

(3) Fuller's earth is used for refining of petroleum

(4) Animal charcoal is used to decolorise raw sugar solution.

b) (1) The metal Iron ($E^0 = -0.44 \text{ V}$) displaces lower metal Cu ($E^0 = +0.34 \text{ V}$) from solution

$$\begin{aligned}
 (2) \text{ e.m.f} &= E^0_{\text{Cathode}} - E^0_{\text{anode}} \\
 &= 0.34 - (-0.44) \\
 &= \underline{\underline{+0.78 \text{ V}}}
 \end{aligned}$$

c) In cathodic protection an active metal like Zinc or Magnesium is connected to Iron pipe through a wire. Pipe acts as cathode and gets protected.

In barrier protection method a metallic coating which is to be protected. It acts as a barrier between metal and environment.

d)

Metallic conduction	Electrolytic conduction
<ul style="list-style-type: none"> • Conduction is due to movement of electrons 	<ul style="list-style-type: none"> • Conduction is due to movement of ions
<ul style="list-style-type: none"> • There is no transfer of matter 	<ul style="list-style-type: none"> • There is no transfer of matter
<ul style="list-style-type: none"> • No chemical change 	<ul style="list-style-type: none"> • A chemical change takes place.
<ul style="list-style-type: none"> • It decreases with temperature rise 	<ul style="list-style-type: none"> • It increases with temperature rise

UNIT-ii

VI. a) (1) Functional group is an atom or atom group that determine the properties of an organic compound.

(2) Isomerism is the phenomenon of having same molecular formula but different properties.

b) Homo polymer consist of single type of monomer

Eg: polythene, PVC , Nylon – 6

Copolymer consist of different type monomer

Eg: Buna – S , Buna – N

c) The qualities of good fuel are

- High calorific value
- Moderate velocity of combustion
- Low moisture content
- Low storage cost and to transport

d) (1) Green house effect is the warming of earth atmosphere due to absorption of IR radiation by CO₂. After absorption, these thermal IR radiation are re-emitted in all direction.

(2) The presence of excessive acid like HNO₃ and H₂SO₄ in rain water makes it acidic . It lowers the pH of rain water below 5.6

OR

VII.

a) **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

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

3 types a) 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

- | | |
|---------------|-----------------------|
| c) (1) Buna-S | Butadiene and Styrene |
| (2) Neoprene | Chloroprene |
| (3) Teflon | Tetra fluoro ethylene |
| (4) Nylone-6 | Caprolactum |

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.

Green chemistry is the development and implementation of chemical products and process , which are less hazardous to human health and environment.

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