

TED(10)-1016 B
(REVISION-2010)

Reg No.....
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SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING

TECHNOLOGY-MARCH, 2014

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) What is corrosion. Write two examples. 2
b) Write a note on metal matrix composite 2

PART-B

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

- II a) Write the differences b/w electroplating & Anodising 4
b) Mention any one use of the following
i) Silica ii) Ferric chloride
iii) Charcoal iv) Nickel 4
- III a) Number of organic compounds are very large compared to inorganic compound. Account for this statement. 4
b) Describe the impact of four pollutants on the environment. 4
- IV a) what is propellant? Explain the different types of propellant with example. 4
b) Explain type of corrosion takes place when a zinc rod is partially dipped in potassium nitrate solution. 4

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

UNIT-i

- V a) explain the difference in phenomenon takes place when
- i) anhydrous calcium chloride is placed in water
 - ii) silica jelly is placed in water. 4
- b) write the reactions with reasons.
- i) iron rod is placed in copper sulphate solution.
 - ii) zinc is placed in copper sulphate solution. 4
- c) what is galvanization. Explain the mechanism of rusting of iron. 4
- d) what are the advantages of nicad cell over the other cell 3
- OR
- VI a) write the differences between galvanic cell and electrolytic cell. 4
- b) explain the effect of pressure and temperature on adsorption. 4
- c) cathodic protection is also called sacrificial protection. Comment this statement which is most preferred.
- 1) Coating of zinc over iron
 - 2) Coating of tin over iron 4
- d) explain the mechanism of hydrogen oxygen fuel cell. 3

UNIT-ii

- VII a) Write one example each for the following
- i) Heterocyclic Compounds
 - iii) Alicyclic Compounds

- ii)Homo cyclic Compounds iv)Aromatic compounds 4
- b) i) Describe a method to increase the strength of Natural rubber
- ii) Mention the advantages of synthetic rubber over natural rubber 4
- c) Write four relevance of green chemistry 4
- d) Mention any three qualities of a good fuel 3

OR

- VIII) a)What do you mean by Green house effect. What are its consequences? How will you reduce it? 4
- b) What are the main components present in the following substances
- i) LPG iii)Producer Gas
- ii)Natural Gas iv)Water gas 4
- c) Write any four differences b/w addition & condensation polymerization 4
- d) Draw the isomers of the following molecular Formula
- i)C₂H₆O ii)C₄H₁₀ 3

ANSWERS

I)

a) It is the slow destruction of metal due to attack of atmospheric gases like CO₂, water vapour etc on the surface of metals .Ex: Rusting of Iron, Tarnishing of silver

b) Composites are reinforced plastics. It consists of a matrix phase and dispersed phase. Here matrix phase is metal & dispersed phase is fibre

II)

a) **Electroplating/Electrode position:** It is the deposition of Superior metal (called Noble metals) on the surface of base metal using electricity. Here **cathode= base metal, Anode= Noble metal & Electrolyte=Soluble salt solution of noble metal**

Eg: Coating of Ni on a steel spoon

Anodising: Coating of a thin uniform /protective oxide film (of the metal itself)on the surface of base metal (or non ferrous) like Al, Mg etc by passing current. Here **cathode**=Graphite rode, **Anode**=Base metal & **Electrolyte**=Dil H_2SO_4

Ex: Soap dishes, flower vase, pen cape....

- b)i) As a filler for paints,plastic etc
- ii)As a adsorbent
- iii) As a coagulationg agent for water treatment
- iv) As a catalyst

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) **Tetra Covalency**: Sharing of four valence electrons
 - 4) **Possibility to form multiple bonds** : Double bond and triple bond
 - 5) **Strength of C-C bond** : C-C bond is stronger than other bond

b)

- CFC: Cause Deplete of ozone layer
- CO₂: Cause Green house effect
- SO₂: Cause acid rain
- CH₄: Cause global warming

IV)

- 1) Solid propellant Eg : Gun powder
- 2) Liquid propellant Eg : Methyl nitrate
- 3) Hybride propellant Eg : Acrylic rubber and liquid N₂O₄

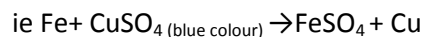
b)Diffeerential aeration/ oxygen concentration cell corrosion:

It Occure due to difference in the concentration of oxygen. Here poorly oxygenated part act as anode & undergo oxidation ie $Zn \rightarrow Zn^{2+} + 2e^-$ & hence undergo corrosion & Oxygen rich part act as cathode (ie $\frac{1}{2} O_2 + H_2O + 2e^- \rightarrow 2OH^-$) in the presence of an Electrolyte

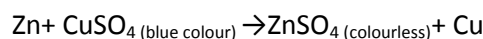
V

- I. a) (i) **ADSORPTION** : Adsorption of water take place on the surface of silica gel
(ii) **ABSORPTION**: Water vapour uniformly absorbed by anhydrous CaCl₂

b)i) Here Fe displace Cu From CuSO₄ solution

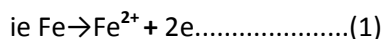


ii) Here Zn displace Cu From CuSO₄ solution

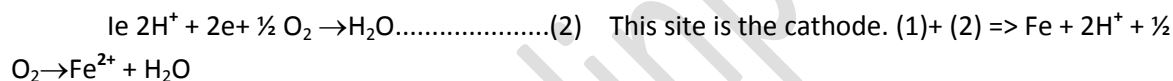


c) Galvanization is the process of coating Zink on the surface of iron.

Rusting of Iron: It is a electro chemical process. Here Electrolyte is moisture containing CO₂, DO etc & impure Fe act as anode, undergo oxidation



This electrons are accepted by H⁺ (formed from H₂O etc) & combine with oxygen form water



The Fe²⁺ formed is then oxidised to Fe³⁺ in the presence of air & water $\text{Fe}^{2+} + \text{O}_2 + \text{H}_2\text{O} \rightarrow \text{Fe}_2\text{O}_3 + 2\text{H}^+$

O R $\text{Fe}_2\text{O}_3 + n\text{H}_2\text{O} \rightarrow \text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$ (Rust). Ie **Hydrated ferric oxide** is chemically known as rust

d) It is a Secondary Cell. So Can be recharge, can be use again & again, Redox reaction occur more than once, used in electronic flash units

VI)

a)

Galvanic Cell	Electrolytic Cell
<ul style="list-style-type: none">→Convert CE to EE→Anode is negative & Cathode is positive→ Redox reaction in separate containers→Contains salt bridge→Ex Daniel Cell	<ul style="list-style-type: none">→Convert EE to CE→Anode is positive & Cathode is negative→ Redox reaction in samecontainers→No salt bridge→Electrolysis of NaCl

b) Temperature: As the temperature increases, adsorption decreases, because adsorption is an exothermic process.

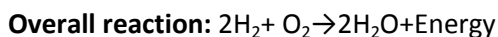
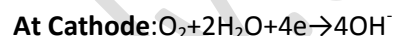
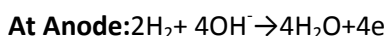


Pressure: At constant temperature, adsorption increases with increase of pressure


c) **Cathodic protection:** Protect the metal by making it as cathode. Ex: Zn, Mg pieces are attached along with Ships, under buried Iron pipes etc. But **sacrificial protecton** is the coating the Fe objects with more active metals like Zn etc. in both case Fe act as cathode & prevent from corrosion

d) It is a fuel cell.

Here Anode= H_2 & Cathode= O_2 & Electrolyte=aq: KOH/ NaOH



VII)

- a) i) Furan
ii) Benzene
iii) 
iv) Benzene

b) i)) Vulcanisation : It is the process of heating natural rubber with sulphur or sulpher compound at a temperature of $110-140^\circ\text{C}$

ii) High elasticity, Less sensitive to temperature change, No reaction with oil, acid etc

c) It focuses on processes & Products that reduce the generations & use of Hazardous substances
Its main relevance's are b

- 1) Use sunlight & Micro waves
- 2) Using liquid CO_2 as a detergent for dry cleaning instead of Carcinogenic tetra chloro ethane
- 3) Use H_2O_2 for bleaching water instead of Cl_2
- 4) Use paper bags instead of plastic covers

d) 1) High CV 2) Do not produce smoke 3) Low non combustible matter content 4) Not produce harmful products like SO_2 , CO etc

VIII)

a) Phenomenon in which earth's atmosphere traps heat or IR Radiation from the sun & prevent it from escaping to outer space. Global warming is its consequences. It can be reduced by plantation, use of HFC instead of CFC etc

b) **Compressed Natural Gas (CNG):** Mainly contains CH_4 , ethane & propane. It causes no pollution. It is used as a domestic fuel...

LPG OR Refinery Gas OR Bottled Gas: Contains butane, propane etc. Used as a domestic fuel, fuel in industries, motor fuel etc. Causes no pollution, no smoke.

Producer Gas ($\text{N}_2 + \text{CO}$): It contains N_2 , CO , H_2 , CH_4 , CO_2 etc. Used as a reducing agent, for running gas engine...

Water gas/Blue gas ($\text{H}_2 + \text{CO}$): Contains N_2 , CO , H_2 , CH_4 , CO_2 . Used for manufacturing ammonia gas as a source of H_2 , as a fuel etc.

c) 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 of small molecule like H_2O , NH_3 . Their monomers contain two or more functional groups. It is also called step growth polymerization.

Eg: Polyester , Bakelite , Nylon-6,6

d) It is the phenomenon of having same molecular formula but different physical and chemical properties.

(i) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$ And $\text{CH}_3 - \underset{\text{CH}_3}{\text{C}} - \text{CH}_3$

CH_2

(ii) $\text{CH}_3 - \text{O} - \text{CH}_3$ and $\text{CH}_3 - \text{CH}_2 - \text{OH}$