Question Bank

MODULE1

ELECTROCHEMICAL ENERGY SYSTEM:ELECTROPOTENTIAL&CELLS

Jan 2013

1a)Choose your answer for the following:

i) The standard reduction potential Mn and Fe are -1.18V and -0.44V Respectively. The standards emf of cell formed by combining the above 2 electrodes will be

A)+0.74V B) -0.74V C) +1.62V D) -1.62V

ii)Primary reference electrode used to measure the electrode potential of other electrodes is

A) SHE B) Calomel electrode C) Glass electrode D)Ag-AgCl electrode

iii) reference electrode used in potentiometric determinations is

A)Glass electrode B) Pt electrode C) Calomel electrode D) Ion selective electrode

iv) If the the direction of flow of electrons in electrochemical cell is right to left then the cell reaction is

A)non spontaneous B) spontaneous C) reversible D) irreversible (04M)

b) An electrochemical cell consist of metallic Zn immersed in 0.1M$Zn(NO_3)_2$solution and metallic Cu immersed in 0.2M $CuSO_4$ solution.CalculateEMF of the cell at 25^0C and change in free energy of the cell reaction .E^0 of cell=1.1V (05M)

c) EMF of the cell $Ag/AgNO_3(C_1)//(C_2$=0.2M)$AgNO_3/Ag$ is 0.8V. Calculate C_1 of the cell (05M)

d) What are ion selective electrode? Discuss the construction of glass electrode and derive an expression relating glass electrode potential and pH (06M)

June/July13

2 a) i) If the direction of flow of electron in a galvanic cell is left to right then the name of cell rection is

A) Reversible B)Irreversible C)Non spontaneous D) Spontaneous

ii)SHE connot be used in the presence of

A)Reducing agent B) Oxidizing agent C) Water diluting agent D) All of these

iii) Calomel electrode is reversible wrt to

A)Calomel B)Mercury C) Chloride ions D)None

iv)Glass electrode can be used up to pH of

A)4 B)14 C)9 D)12 (04M)

b) Derive Nernst equation for the potential of electrode (05M)

c)Calculate the voltage of a cell which consist of a rod of iron immersed in 1.0M solution of FeSO4 and a rod of manganese immersed in 0.1M MnSO4 at 25.C .Write the cell reaction .Give EoFe2+/Fe= -0.44V and Eo Mn2+/Mn=1.18V.(05M)

d) discuss the construction and working of glass electrode to determine pH of

a solution. (06M)

Dec.2013/Jan.2014

3.a. Choose the correct answers for the following:
i) A metal rod is dipped in a solution of its ions. Its electrode potential is independent of:
A) temperature of solution B)Concentration of solution
C)area of the metal exposed D) Nature of metal
ii)The emf of a cell consisting of a SHE and a metal is found to be 0.74V. The SHE is the positive electrode in the combination. Then the potential of the metal electrode is:
A)+0.74V B)+1.74V C) 0.37V D)-0.74V
iii) Electrode potential of a metal in a dilute solution is:
A) same as that in a concentrated solution.
B) lower than that in concentrated solution.
C)higher than in a concentrated solution
D)none of these.
iv) The potential of the two metal electrodes used in a cell are 0.35V and 0.85V. The emf of the cell formed by combining them is:
A)1.20V B) 0.5 V C) -0.50V D) -1.20V (04M)
b) What are concentration cell? Explain the working of a concentration cell by taking suitable example. (05M)
c) Explain a method for the determination of single electrode potential. (06M)
d) An electrochemical cell consists of magnesium electrode in 0.042m mg(N03)2 solution and silver electrode in 0.35m AgNo3 Solution. The SEP of Mg and Ag are -2.363V and +0.80V respectively. Represent the cell. Write the cell reaction and calculate the emf of the cell. (05M)

June- July .14

4a) i)In a Conc. cell the electrode kept in contact with a soln. of lower conc. act as
A) AnodeB)Cathode C)Both A & B D)None
ii) Example of an ion selective electrode
A)Calomel electrode B) Platinum electrode C) Glass electrode) D) Ag-AgCl electrode
iii) Calomel electrode is reversible w.r.t
A) Hg ions B)Cl- ions C)Both A & B D)None
iv)In an galvanic cell the oxidation takes place at
A) Anode B)Cathode C)Both A & B D)None (04M)
b) What are secondary reference electrode.Explain Construction & working of calomel electrode (06M)

c) Explain determination of pH of glass electrode (06M)
d) What are reference electrode ? Explain the construction & working of Ag-AgCl electrode (05M)

Dec.2014/Jan.2015

5a) Derive Nernst's equation for single electrode potention. (05M)

b) Describe the construction and working of calomel electrode. (05M)

c) What are reference electrodes? Explain the determination of electrode potential of an unknowe electrode using calomel electrode. (05M)

d)What are concentration cells? the emf cell of the $Ag|AgNO_3(0.0083M0)||AgNO_3(xm)|Ag$ was found tobe 0.074V at 298K. calculate the value of and write cell reaction. (05M)

June/July2015

6a)Explain the construction and working of glass electrode. (05M)

b. Give the construction of calomel electrode. Justify that it is a reversible electrode. (05M)

c) Define reference electrode. Explain the measurement of standard electrode potential using calomel electrode. (05M)

d) A cell is obtained by combining two Cd electrodes immersed in cadmium sulphate solutions of 0.1M and 0.5M at 25^oc. Give the cell representation, cell reaction and calculate EMF of the cell. (05M)

BATTERY TECHNOLOGY & FUEL CELLS

January 2013

1a. Choose the correct answer for the following:
i]In which of the following the net cell reaction is irreversible
A]Dry cell B]Lead-Acid battery C]Ni -Cd battery D]Lithium ion battery
ii]During discharging of Lead-Acid battery, the concentration of s phuric acid
A]Increases B] Decreases C] Becomes Zero D] Remains constant
iii] Super capacitor stores
A]Electrical energy B]Chemical energy C]Heat energy D]Both chemical and electrical energy
iv]In a fuel cell,electricity is produced by
A]Combustion B]Electrolysis C]Knocking D] None of these (04M)

b.Explain the construction and working of acid storage battery. (07M)
c. Explain the working of lithium ion battery. Write the advantages of Li battery.
(06M)
d.Mention any three advantages of fuel cell. (03M)

June/July13

2a.i) Double sulphate theory of lead acid battery is proposed by
A) Nernst B) Farady C) Glasston and taube D) Melmholtz
ii)Oxidation of methanol in methol-oxygen fuel cell is a process of
A) One electron B)4 electron C) 2 electron D) 6 electron
iii)Active material for anode in Ni- MH battery is
A)NiO.OH B) Ni(OH)2 C) H2 D)None
iv)Electrolyte used in Li batteries
A)Aqueous B)Mixture of aqueous and non aqueous C) Non aqueous D)None
(04M)
b) Explain the construction & working of Zn-air battery (05M)
c) Explain the following battery characteristics
i) Voltage ii) Cycle life iii) Energy efficiency (06M)
d) Explain the construction & working of H2-O2 fuel cell. (05M)

Dec.2013/Jan.2014

3.a. Choose the correct answer for the following:
i) In lead acid battery the product formed on both anode and cathode is:
A) Pbo2 B) PbO C) PbS04 D)Pb
ii) A battery in which a key component is separated from the battery prior to its activation is called:

A)Primary battery B) Secondary battery C)Tertiary battery D) Reserve battery
iii) In which of these batteries aqueous KOH is used as an electrolyte?
A)Ni-cd B)Ni-MH C) Zn-air D) All of these
iv) In which of the following battery the cell reaction is not reversible?
A) Pb-Pbo2 B)Li-Mno2 C) Ni-MH D) Ni- Cd (04M)
b. Explain the construction and working of Zn-mno2 battery. (05M)
c. What are fuel cells? How it differ from battery? Explain the construction and working of CH3OH-O2 fuel cell. (06M)
d.Write the discharing and charing reactions in the following batteries:
i)Ni-Cd battery: ii) Ni-MH battery (05M)

June/July 2014

4ai) The fuel cell are more superior than than conventional batteries are
A) They are light in weight B) They are ecofriendly C) They produce direct at low cost
D) They are easily ecofriendly
ii) The electrolyte used in Zn –air battery
A) H2SO4 B) KOH C) KCl D) None
iii)Which of the following battery is reserve battery
A) Zn-air B) Ni-MH C) Zn-Ag2O D) Li-MnO2
iv) In Pb-acid battery,during discharge the product formed at electrode
A) PbO2 B) PbO C) PbSO4 D) Pb (04M)
b) Explain the following battery characteristics
i) Cycle Life ii) Energy density iii) Capacity (06M)
c) Explain the construction & working of Ni-Cd (05M)
d) Explain the construction & working of Me-O2 fuel cell (05M)

Dec.2014/Jan.2015

5a. What are batteries? Explain the following battery characteristics.
i) Capacity ii) cyele life. (05M)
b. Describe the construction and working of nickel metal hydride battery . (05M)
c. Define fuel cell. Explain the construction and working of methanol oxygen fuel cell. (05M)
d. Explain the construction and working of lithium ion battery. (05M)

June/July2015

6a)Discuss the construction and working of Li-Mno_2 battery. (05M)
b)What are fuel cells? How is it different from galvanic cell? Mention any two advantages of fuel cell. (05M)
c)Discuss the construction and working of Li-Mno_2 battery. (05M)

d)Explain the construction and working of methanol- oxygen fuel cell. Mention any two applications. (05M)

MODULE -2

METAL FINISHING & ELECTROLESS PLATING

January 2013

1a. Choose the correct answer for the following:
i] In electro plating process , the overvoltage depends on
A] Temperature B] Current density C] Electrolysis D] All the above
ii] The anode used in electroplating of chromium is
A] Chromium B] Copper C] Graphite D]Pb-Sb
iii] Which of the following is essential in electroless plating ?
A] Oxidizing agent B] Complexing agent C] Buffering agent D] Reducing agent
iv] In electroplating , throwing power is said to be good if the deposit is
A]Fast B]Slow C]Thick D]Uniform (04M)

b. Define the term metal finishing . Mention any three technological importance of metal finishing. (05M)

c. Explain the process of electroplating of chromium. (05M)

d. What is electroplating ? Explain the electroless plating of nickel. (06M)

June/July13

2a) conducters and insulators can be plated by

a) i) In electroplating process the overvoltage potential depends on
A) Electroplating B) Electrolessplating C) Electropolishing D)None
ii) The phenomenon in which back emf produces due to product of electrolysis is
A) Electroplating B) Electrolessplating C) Polarisation D) None
iii) When the metal structure to be plated is irregular,the process employed is
A) Electroplating B) Electrolessplating C) Electropolishing D)None iv) Addition of Complxing agent to the plating bath is to
A) Increases in metal ion conc.B) Decrease in metal ion conc.C) Increase the rate of
deposition D) None (04M)
b) Explain the process of electroplating of Cu(06M)
c) Mention difference b/w electroplating & electroless plating(04M)
d) Discss the role of following factors on the nature of electrodeposit
i) Metal ion conc.ii) Wetting agents (06M)

Dec.2013/Jan.2014

3. a. Choose the correct answers for the following:
i) In chromium plating electrolyte used in the bath solution:
A) In chromium plating electrolyte used in the solution:
A) H2Cr04+H2So4 B)K2Cr04 +H2So4
C)HC104 + H2Cro4 D)None of These
ii) Printed Circuit boards are prepared by the process of:
A) Electroplating B) Electro polishing
C) Electroless Plating D) Electroforming
iii) The ability of the Plating bath to develop uniform coating on the entire surface of the object is measured by its:
A) Current density B) Decomposition potential
C) plating power D) Throwing power
iv) Polarization effect can be minimized by using:
A) Large electrode surface B) Highly conducting solution
C) Low electrolyte concentration D) All of these (04M)
b. Explain the following terms:
i) Polarization ii) Decomposition potential. (05M)
c. Explain how the following plating variables affect the nature of deposit:
i) Current densityii) PHiii) Complexing agent. (05M)
d. What is electroless plating? Explain electroless plating of copper? (06M)

June/July 2014

4a) i) In electroplating process the overvoltage potential depends on
A) Electrolyte B) Temp. C) Current density D) All the above
ii) In Cr plating anode is
A) Soluble Cr anode B) Insoluble anode C) Inert anode D) both b & c
iii) Autocatalytic method of plating is also known as
A) Electroplating B) Electrolessplating C) Electrolysis D) Electrorefining
iv) For a electrolytic mixture containing Zn2+,Cu2+,Ag+ the ion which is going to be dischared first is
A) Zn2+ B) Cu2+ C) Ag+ D) None (04M)
b) Explain Decomposition potential & over voltage.Why practical is greater than
theoretical E(05M)
c) Explain electrolessplating of Ni & its applicatio(05M)
d)Explain electroless plating of Cu(05M)

Dec.2014/Jan.2015

5a. What is electro less plating? Write the difference between electroplating and plating. (05M)

b. Discuss the electroplating of gold using Acidic Cyanide bath . (05M)

c. Explain the cffect of any two the nature of electro deposit. (05M)

d. Explain the process of electroless plating of copper with relevant reactions. (05M)

June/July2015

6a)Explain the following factors influencing rate of electro-deposit. i) current density ii) metal ion concentration iii) throwing power. (05M)

b)Explain the process of electroplating of chromium for engineering applications. Indicate the reasons for not employing chromium as anode. (05M)

c)Write a short note on i) polarization ii) Decomposition potential (05M)

d)Explain the process of electroless plating of copper on PCB. (05M)

CORROSION SCIENCE & CORROSION CONTROL

January 2013

1a. Choose the correct answer for the following:

i]The reaction that takes place during corrosion of a metal is

A]Reduction B]Redox C]Oxidation D]Precipitation

ii]Corrosion of steel boiler along the riveted portion is an example of

A] Differential metal corrosion B] Differential aeration corrosion

C] Stress corrosion D]Grain boundary corrosion

iii] During electro chemical corrosion in a dearted acidic medium

A] oxygen is evolved at anode B] oxygen is reduced at anode

C] Hydrogen is evolved at cathode D] Hydrogen is oxidized at cathode

iv]Galvanizijng is an example of

A] cathodic metal coating B] Anodizing

C]anodic metal coating D] None of these (04M)

b .Define the term corrosion .Explain the electro chemical theory of corrosion wrt iron.(7M)

C. what is cathodic protection ? How a metal is cathodically protected by sacrificial anode method. (06M)

D. Write a note on galvanization (03M)

June/July13

2a)Choose your answer for the following:
i) In galvanic corrosion the less active metal always acts as
A)Anode B)Cathode C) Both Anode and Cathode D) None
ii)Caustic embrittlement of boilers is due to presence of excess of
A) Na_2CO_3 B) $Ca(OH)_2$ C) $CaSO_4$ D) $CaCO_3$
iii) In differential aeration corrosion the area more accessible t0 air acts as
A) Cathode B) Anode C) Anode and Cathode D) None of these
iv) electrolyte is used in anodizing of Al is
A)H_2SO_4 B)KOH C)HCl D) NH_4Cl

(04M)

b) Explain the following types of corrosion i)galvanic corrosion ii)stress corrosion (06M)

c)What is anodizing ?Explain the anodizing of Al. (05M)
d) What are corrosion inhibitors?Explain how corrosion is controlled by inhibitors. (05M)

Dec.2013/Jan.2014

3. a. Choose the correct answers for the following:
i) When a buried pipeline is protected from corrosion by connecting to magnesium block it is called:
A) Impressed voltage protection B) Sacrificial cathodic protection
C) Sacrificial anode protection D) None of these
ii) During galvanic corrosion the move noble metal act as:
A) Anode B) Cathode C)anode as well as cathode D)None of these
iii) In Water Line corrosion , the maximum amount of corrosion take place:
A) along a line just above the level of water meniscus
B) along a line at the level of water meniscus
C) along a line just below the level of water meniscus
D) at the bottom of the vessel.
iv) During differential aeration type corrosion, the corrosion:
A) occurs at more oxygenated part. B) occurs at less oxygenated part
C) occurs uniform throughout D) none of these (04M)
b. What is metallic corrosion? Explain electrochemical theory of corrosion by taking iron as example. (06M)
c. explain the corrosion control technique by cathodic protection. (05M)
d. Explain galvanization process. (05M)

June/July 2014

4a)i) Alkali & alkalibne earth metals from an oxide
A)protective B)highly adherent C)non porous D) porous
ii)Caustic embrittlement is an example corrosion of

A)differential metal B)differential aeration C)stress D) water line
iii) Intense corrosion takes place when
A) smaller cathodic areaB)larger anodic areaC) larger cathodic area
D).smaller anodic area
iv)copper containers to store food stuffs are coated with
A)Zn B)Al C)Sn D)Ni (04M)(04M)
b) Discuss the electrochemical theory of corrosion taking iron as corroding metal. (05M)
c) Explain the following types of corrosion i) differential metal ii) stress iii) water line corrosion(06M)
d) Discuss the sacrificial anode & impressed current methods of corrosion control (05M)

Dec.2014/Jan.2015

5a. Explain the clectrochemical theory of corrosion by taking iron as an exampie.(05M)
b. What is corrosion ? explan the following factors affectin the rate of corrosion : i) Nature of corrosion product ii) Anodic and cathodic area .(05M)
c. What is Anodisin? Explain the anodizing of aluminium. .(05M)
d. What is Cathodic protection ? Explain sacrificial anodic method and impressed method. (05M)

June/July2015

6a)What is stress corrosion? Explain stress corrosion in boilers due to alkali with chemical reactions. (05M)
b)How does the following factor affect the rate of corrosion? (05M)
c)What is cathodic protecton? Explain sacrificial anodic method and impressed current method. (05M)
d)Explain the electro chemical theory of corrosion by taking iron as an example. (05M)

MODULE-3

CHEMICAL ENERGY SOURCES & SOLAR ENERGY

January 2013

1a. Choose the correct answer for the following:
i] If GCV and NCV are equal,the fuel has
A] No hydrogen content B] Low hydrogen content
C] High hydrogen content D] High carbon content
ii]The knocking characteristics of petrol is expressed in terms of
A]Ocane number B] Cetane number C]Calorific value D] Power number
iii]Photovoltaic cell is
A]Energy conversion device B]Storage cell C]Rechargeble cell D]Fuel celli
iv] Sythesis of biodiesel involves
A]Transesterification B]Hydrolysis C]Redox reaction D]Condensation(07M)
b.Define the term fuel. Explain the determination of calorific value of solid fuel. (06M)
c. .Define term ocane number. Describe two methods of improving ocane number. (03M)
d.What are photovoltaic cells? List out its advantages. (04M)

June/July13

2a)Choose your answers for the following:
i) The process of breaking down hydrocarbons of high molecular weight into lighterhydrocarbon A)refining B)reforming C)isomerisation D)cracking
ii)The octane number of a fuel is a measure of
A)ability to resist antiknocking B)inability to offer resistance of antiknocking C) ability toresist knocking D)none
iii)The addition of TEL to gasoline is A)decrease the octane number B)increase the octanenumber C) decrease the cetane numberD) increase the cetane number
iv) pPhotovoltaic cell consists of

A) p-n junction B)n type junction C)p type junction D)none (04M)
b)What is reforming of petroleum?give any four reactions involving in reforming . (06M)
c) Discuss the following
i)Power alcohol ii) Biodisel(06M)

d) On burning 0.85g of a solid fuel in a bomb calorimeter the temperature of 2.1kg of water is increased from 24^0C to 27.6^0C the water equivalent of calorimeter and latent heat of steam are 1.1 Kg and 2454KJ/Kg, specific heat of water is 4.2KJ/Kg/^{0}C (It contain 2.5% of H_2)(04M)

Dec.2013/Jan.2014

3. a. Choose the correct answers for the following:
i) A knocking sound is produced in the internal combustion engine when the fuel:
A) burns slowly B) burns fact
C) contains rain water D) None of these
ii) For good performance, the hydrocarbon molecules in a diesel fuel should be:
A) Straight chained B) Branched chain
C) side chained D) Aromatic
iii) Catalytic cracking of heavy oil is carried out to vget better quality;
A) Kerosene B) Diesel
C) Gasoline D) Lubricating oil
iv) Suitability of diesel fuel is determined by:
A) octane number B) Propane number
C) cetane number D) butane number (04M)
b. Define calorific value. Explain how calorific value of solid fuel is determined by bomb calorimeter. (06M)
C.0.78g of coal containing 1.9% hydrogen. When burnt in a bomb calorimeter, increased the temperature of 2.7kg water from 27.20c to 29.70C. if the water equivalent of calorimeter is 1.2kg. calculate gross and net calorific value (specific neat of water 4.187kJ/kg/0 C, latent heat of steam 2457kJ/Kg. (05M)
d. Explain the purification of silicon by zone refining process. (05M)

June/July 2014

4a) i) Bomb calorimeter is used for determining the calorific value of
A)Solid fuel B) Liquid fuel C) Gaseoues D) A & B
ii) Octane number is related to the petroleum product
A) Diesel B) Kerosine C) Petrol D) Lubricating oil
iii) The process by which higher hydrocarbon are broken into lower hydrocarbons by application of heat by
A) Combustion B) Cracking C) Sparking D) Jetting
iv) Quality of diesel fuel is determined by

A) Octane rating B) % of Carbon C) Length of hydrocarbon chain D)Cetane number (04M)

b)What is meant by cracking? Explain fluidized bed catalytic cracking(06M)

c) What is knocking?What are ill effects?Give the mechanism of knocking (05M)

d) What are chemical fuels.Give the classification of fuels with example (05M)

Dec.2014/Jan.2015

5a. What is Cracking ? Explain the fluidized cracking process.(05M)

b. On burning 0.76 x 10^{-3} Kg a solid fuel in a bomb calorimeter, the temperature of 2.5 Kg of water is increased from 25^0 C to 28^0C.The water equivalent of calorimeter and latent heat of steam are 0.486Kg 2457 Kj /Kg respectively. Caculate its GCV and NCV.Given Sp . heat = 4.187 Kj / Kg/ ^{0}C and % of H_2 is 2.5 (05M)

c. Discuss the production of solsr grade silicon by Union –Carbide process. (05M)

d. what are the advantages and disadvantages of PV –Cells? (05M)

e. Explain the determimation of calorific value of a solid fuel using calorimeter.

f . Define the following term i)Chemical fuel ii) Calorific value iii) biodiesel iv) octane number v) Reforming of petrol (05M)

g. Discuss the construcrtion and working of a PV –Cell. (05M)

h. What is doping ? Discuss the purification of silicon of zone –refining. (05M)

June/July2015

6a)On burning 1.15g of a coal sample in a bomb calorimeter, the temperature of 3.5kg of water in the calorimeter increased from 26.5^0 C.to 28.5^0 C. water equivalent of calorimeter is 325g. Specific heat of water 4.187kJ/kg/^{0}C. Latent heat of steam =587 Cal/g. If the fuel contains 4% hydrogen, Calculate gross and net calorific values. (05M)

b)Explain synthesis of petrol by Fischer Tropseh process. (05M)

c)Define octane number. Explain reformation of petrol with equations. (05M)

d)What is biodiesel? How is it prepared ? What are the advantages? (05M)

e)Discuss the construction and working of a photovoltaic cell. (05M)

f)Explain the production of solar grade silicon by Union- Carbide process. (05M)

g)What is doping? Explain doping of Si by diffusion Technique. (05M)

h) Explain the designing of PV cells- Module, panel and Array. (05M)

MODULE-4

HIGH POLYMERS

January 2013

1a. Choose the correct answer for the following:
i]Polymethyl methacrylate is commercially called
A]Teflon B]Bakelite C]Plexiglass D]Araldite
ii]Which of the following is an adhesive?
A]Neoprene B]Buna –S c]Epoxy resin D]Polystyrene
Iii]Below its glass transition temperature, a polymer is
A]Viscofluid B]Soft and rubbery C]Hard and brittle D]Soft and brittle
iv]Polymer composites consists of
A]Matrix and plasticizer B]Fibre and piasticizes C]Fibre and matrix D]None of these(04M)

b.Explain the mechanism of addition polymerization with respect to ethylene. (06M)

c. Explain the term glass transition temperature. Mention the factors that influence Tg. (05M)

d.Describe the manufacture of the following polymers: i]Teflon; ii]Bakelite. (05M

June/July13

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hydrocarbon A)refining B)reforming C)isomerisation D)cracking
ii)The octane number of a fuel is a measure of

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iii)The addition of TEL to gasoline is A)decrease the octane number B)increase the octane number C) decrease the cetane numberD) increase the cetane number

iv) pPhotovoltaic cell consists of

A) p-n junction B)n type junction C)p type junction D)none (04M)

b)What is reforming of petroleum?give any four reactions involving in reforming . (06M)

c) Discuss the following

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d) On burning 0.85g of a solid fuel in a bomb calorimeter the temperature of 2.1kg of water is increased from 24^0C to 27.6^0C the water equivale calorimeter and latent heat of steam are 1.1 Kg and 2454KJ/Kg, specific heat of water is 4.2KJ/Kg/^{0}C (It contain 2.5% ofH_2(04M)

Dec.2013/Jan.2014 7.

3a. Choose correct answers for the following:

i) Aplastic which can be softened in heating and hardened on cooling is called:

A) thermoplastic B) thermosetting

C)thermoelastic D) thermite

ii) Which of the following is an elastomer:

A) PVC B) Bakelite

C) Nylon D) Neoprene

iii) Chloroprene is the repeating unit in:

A) Polystyrene B)Neoprene

C)PVC D) Polythene

iv) The process of vulcanization makes rubber:

A) Soluble in water B) Soft

C) Hard D) More elastic (04M)

b. What is glass transition temperature? Explain any three factors that influence the glass transition temperature. (05M)

c. Explain the manufacture of plastic by compression moulding and injection moulding technique. (05M)

d. Give the synthesis of i) Teflon ii) Neoprene iii) Polyurethane. (06M)

June/July 2014

4a) i) Bomb calorimeter is used for determining the calorific value of

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d) What are chemical fuels.Give the classification of fuels with example (05M)

Dec.2014/Jan.2015

5 a. Explain the free radical mechanism of addition polymerization by taking Vinyl chloride as a monomer.

b. what are adhesives?explain the synthesis and applications of epoxy resin.

c. write the syathesis and applications of the following polymers :

i) polymethyl methacrylate ii) Teflon.

d. what are polymer composites ? explain the preparation and uses of Kevlar fiber.

e calculate the number average and weight average molecular mass of a polymer with the following composition

Cl cl–CH_2 –CH– is 40% ; –CH_2–CH– is 30% ;
200 400
Cl
–CH_2–CH – is 30% Given At Wt . of C= 12 . Atomic weight of h= 1 ; and Atomic
500
Weight of ct= 35.5

f. What is glass transition temperature?how is it affected by

i) Intermolecular forces ii) flexibility

g.What is conducting polymer? Explain the mechanism of conduction in polyaniline

h.Give the synthesis and uses of the following polymers :

i) Silicon rubber ii) Polycarbonates.

June/July2015

6a) Explain the free radical mechanism of polymerization taking vinay Chloride asmonomer. (06M)

b)Differentiate addition and condensation polymerization. (04M)

c)Give the synthesis reaction of Teflon and polycarbonate. (04M)

d) Discuss the synthesis, properties and applications of epoxy resin. (06M)

e)Explain the following structure property relationships of polymers.
i) Crystalinity ii) Elasticity iii) Plastic deformation. (06M)
f)Explain the following factors influencing the Tg.
i) Flexibilityii) Branching and cross linking (04M)
g) Explain the synthesis of carbon fibre. (04M)
h)what is conducting polymer? Explain the mechanism of conduction in polyaniline and give the applications. (06M)

MODULE 5
WATER TECHNOLOGY

January 2013

1 a. Choose the correct answer for the following:
I]Alkalinity in water is not due to
A]Hydroxyl ions B]Carbonate ions C] Bicarbonate ions D]Hydrogen ions
Ii]COD of waste water is expressed in
A]ppm of oxygen B]ppm of $CaCO_3$ c] mg of $CaCO_3$ D]mg of oxygen per litre
Iii]Desalination is
A]Removal of hardness from water B]Addition of salt to water
C]Destrction of salts in water D] Removal of salts from water
Iv]The reagent used in calorimetric estimation of nitrate in water is
A]Zr-SPADNA b]Ammonia C]Barium chloride D]Phenol disulphonic acid (04M)
b. . Explain the determination of hardness by complexometric method. (06M)
c.Define BOD and COD.why COD is always greater than BOD. (05M)
d.Explain reverse osmosis process. (05M)

June/July13

2a)Choose your answers for the following:
i)Chloride content of water sample is determined byA)Colorimetric method B)Argentrometric C)SPADNS D)Gravimetric
ii) As the temperature increases the amount of DO of water sample
A) increases B) decreases C)as no effect D)none
iii) R.O is a method of getting pure water from A)sewage water B)industrial waste water

C)sea water D)river water

iv)Estimation of total hardness of water using EDTA titrant involves

A) Neutralisation reactionB)redox reaction C)precipitation reaction D)complexometric reaction(04M)

b)How is Alkalinity of water caused .Explain the method of determining of alkalinity.(06M)

c) Describ the electrodialysis method of desalination of water. 06M)

d) 25cm3 of a sample of COD analysis was reacted with 15cm3 of .2N K2Cr2O7 & the unreacted K2Cr2O7 requires 8.2cm3 0f .2N FAS .25cm3 of same K2Cr2O7 & 25cm3 of distilled water under the same condition requires 16.4cm3 0f .1N FAS.What is COD of water

Dec.2013/Jan.2014

3. a. Choose the correct answers for the following:

i) Total alkanity in water is the sum of:

A) OH^- and CO_3^{2-} ions **B) OH- ions only**

C) CO_3^{2-} ions only **D) OH-, $HCO_3^{2-}$and CO_3^{2-} ions**

ii) The indicator used in the determination of chloride context in water sample by argentometric method is;

A)K3[Fe B)K2CrO4

D) K2CN2O7

iii) Primary treatment of sewage is used to remove:

A) Suspended and floating solids **B) Soluble inorganic solids**

C) Pathogenic bacteria **D) All of these**

iv) The reagent used in the estimation of sulphate by gravimetric method is:

A) Phenol- di- sulphonic acid **B) Barium chloride**

C)2 –SPADANS **D) Barium sulphate (04M)**

b. Discuss the determination of chloride in water by argentometric method. (04M)

c. How is alkalinity of water caused? Explain the determination of alkanity by phenolphthalein indicator. (04M)

d.Define COD. Explain the sewage treatment of activated sludge process. (04M)

June/July 2014

4a)Choose your answers for the following:

i)Permanent hardness is caused due to

A)NaCL B)CaHCO3C)K2SO4 D)MgSO4

ii) Sea water can be desalinated by

A)boiling B)limesoda C)electrodialysis D)none

iii) Alkalinity of water is caused due to

A)OH^- B)CO_3^{2-} C)HCO^{3-} D)All

iv)General impurities present in water are
A)organic matters B)bactreias C)CaSO4 D)All (04M)
b) Discuss the determination of sulphate by using Barium hydrochloride (06M)
c) Define BOD & COD. Calculate the BOD when 1Ltr of effluent from sugar industry containing 150mgm of glucose was completely oxidized into CO_2 & H_2O (06M)
d)Explain the desalination of water by reverse Osmosis. (04M)

Dec.2014/Jan.2015

5)a**. What is boiler feed water ? explain the scale and sludge and sludge formation in boiler .mention their ill effects. (05M)**

b. What is desalination ? explain the desalination of saline water by electro dialysis. (05M)
c. Define COD. Calculate the COD of the effluent sample sample when 25cm^3 of the effluent sample requires 8. 5cm^3 of 0.001 N K^2 Cr^2 O_7 Solution for complete oxidation. (05M)
d.Discuss in detail the softening of water by ion—exchange process. (05M)

June/July2015

6a) what is boiler feed water? Expalin the priming and foaming in boilers. (05M)
b)Define COD. Discuss the Experimental determination of COD of waste water. (05M)
c)Explain the activated sludge treatment of sewage water. (05M)
d)Discuss the Desalination of sea water by reverse osmosis. (05M)

NANO MATERIALS

Dec.2014/Jan.2015

1)a. what are nano materials? Explain the synthesis of nano material by sol- gel method (05M)

b) Write a note on carbon nano tubes.(05M)

c.Explain the synthesis of nanomaterials by hydro thermal process.(05M)

d. what are fullernces ? Explain the synthesis and uses of fullerence.(05M)

June/July2015

2a) what is nano material? Discuss the synthesis of nano material by gas condensation and precipitation methods. (05M)

b) write a note on carbon nano tubes. (05M)

c)Explain the synthesis of nanomaterials by hydro thermal process. (05M)

d) write a note on Dendrimers. (05M)