NMAM INSTITUTE OF TECHNOLOGY, NITTE

Off-Campus Centre of Nitte (Deemed to be University)

Second Semester B.Tech (CBCS) Degree Examinations

CY1003-1-MATERIALS CHEMISTRY FOR COMPUTER SYSTEMS

MULTIPLE CHOICE QUESTIONS: UNIT – I

Electrode & Energy Systems

1.	**The device which converts chemical energy into electrical energy ……**			
	A)	Galvanic Cell	B)	Anode
	C)	Electrolytic Cell	C)	Cathode
Ans	**A)**	**Galvanic cell**		
2.	**The device which converts electrical energy into chemical energy ……**			
	A)	Galvanic Cell	B)	Fuel cell
	C)	Electrolytic Cell	D)	Solar cell
Ans	**C)**	**Electrolytic cell**		
3.	**A working concentration cell is made of two half cells having ……**			
	A)	Identical electrolytes and identical concentrations	B)	Identical electrolytes but different concentrations
	C)	Different electrolytes and identical concentrations	D)	Different electrolytes and different concentrations
Ans	**B)**	**Identical electrolytes but different concentrations**		
4.	**Calomel electrode is an example for…….**			
	A)	Reference electrode	B)	Ion selective electrode
	C)	Inert electrode	D)	Gas electrode
Ans	**A)**	**Reference electrode**		
5.	**What is the chemical formula of calomel used in the calomel electrode?**			
	A)	HgCl	B)	Hg_2Cl_2
	C)	KCl	D)	$HgCl_2$
Ans	B)	**Hg_2Cl_2**		
6.	**The calomel electrode is represented as…….**			
	A)	Hg | Hg_2Cl_2 (s) | KCl (saturated or standard)	B)	Ag | AgCl (s) | KCl (saturated)
	C)	Hg | Hg_2Cl_2 (s) | KCl (saturated or standard) || AgCl (s)|Ag	D)	Ag | AgCl (s) | HCl (0.1M) | glass
Ans	**A)**	**Hg | Hg_2Cl_2 (s) | KCl (saturated or standard)**		
7.	**Potential of the calomel electrode depends on concentration of……..**			
	A)	Hg	B)	Hg_2Cl_2
	C)	KOH	D)	KCl
Ans	**D)**	**KCl**		
8.	**What is the electrode potential of the calomel electrode with saturated KCl solution at 298K?**			
	A)	0.334 V	B)	0.281 V
	C)	0.242 V	D)	0.0591 V
Ans	**C)**	**0.242 V**		
9.	**The reference electrode that can be used to determine potential of zinc electrode is……..**			
	A)	Glass electrode	B)	Platinum electrode
	C)	Copper electrode	D)	Calomel electrode
Ans	**D)**	**Calomel electrode**		
10.	**pH of the solution can be determined using the following electrode combination……..**			
	A)	Glass-calomel electrode	B)	Glass-Zinc electrode
	C)	Platinum-Calomel electrode	D)	Zinc- Calomel electrode
Ans	**A)**	**Glass-calomel electrode**		

11.	**Glass electrode is an example for……**			
	A)	Ion selective electrode	B)	Conductometric electrode
	C)	Gas electrode	D)	Redox electrode
Ans	**A)**	**Ion selective electrode**		
12.	**Which of the following is an example for ion selective electrode?**			
	A)	Platinum electrode	B)	Gas electrode
	C)	Calomel electrode	D)	Glass electrode
Ans	**D)**	**Glass electrode**		
13.	**Which of the following is an example for working concentration cell?**			
	A)	Fe|$FeSO_4$(0.10M) ||$CuSO_4$(0.10M) |Cu	B)	Mg|Mg^{2+}(aq) || Cd^{2+}(aq) |Cd
	C)	Ag|$AgNO_3$ (0.10M) ||$AgNO_3$ (0.50M) |Ag	D)	Fe | Fe^{2+}(0.015M) || Ag+(0.13M) |Ag
Ans	**C)**	**Ag|$AgNO_3$ (0.10M) ||$AgNO_3$ (0.50M) |Ag**		
14.	**Emf of the concentration cell Ag(s)|Ag^+(0.01M)||Ag^+(0.1M)|Ag at 298 ºK is……..**			
	A)	0.0591V	B)	0.02955V
	C)	-0.0591V	D)	-0.02955V
Ans	**A)**	**0.0591V**		
15.	**Emf of the concentration cell Ag(s)|Ag^+(0.05M) ||Ag^+(0.05M)|Ag at 298 ºK is……..**			
	A)	0.0591V	B)	0.02955V
	C)	0V	D)	-0.0591V
Ans	**C)**	**0V**		

16.	**Which of the following is a characteristic of a primary battery?**			
	A)	Rechargeable	B)	Requires external power for operation
	C)	Disposable after use	D)	Suitable for repeated deep discharges
Ans	**B)**	**Disposable after use**		
17.	**Which of the following is *not* a feature of secondary batteries?**			
	A)	Rechargeable	B)	Long-lasting when charged
	C)	Non-rechargeable	D)	Can be used after recharging
Ans	**C)**	**Non-rechargeable**		
18.	**What is the primary material used in the anode of most commercial lithium-ion batteries?**			
	A)	Lithium intercalated in Graphite layers	B)	Silicon
	C)	Lithiated metal oxides	D)	Platinum
Ans	**A)**	**Lithium intercalated in Graphite layers**		
19.	**Which electrolyte is commonly used in lithium-ion batteries?**			
	A)	Lithium hexafluorophosphate ($LiPF_6$)	B)	Sodium hydroxide (NaOH)
	C)	Sulfuric acid (H_2SO_4)	D)	Potassium chloride (KCl)
Ans	**A)**	**Lithium hexafluorophosphate ($LiPF_6$)**		
20.	**Which of the following is NOT a component of battery?**			
	A)	Cathode	B)	Salt-bridge
	C)	Anode	D)	Electrolyte
Ans	**B)**	**Salt-bridge**		
21.	**Special properties of 'Li' metal that make it advantageous as an electrode material include …….**			
	A)	Light weight	B)	Low electrical conductivity
	C)	High electrode potential	D)	Low cost
Ans	**A)**	**Light weight**		
22.	**Which of the following is the optimium Anode-Cathode-Electrolyte combination of a lithium-ion battery?**			
	A)	Li- intercalated graphite-$LiCoO_2$ -$LiClO_4$ in ether	B)	Li- intercalated graphite-$LiNiO_2$ – aqueous KOH
	C)	Li-Cu- $LiBF_4$ in ether	D)	VH_2-$LiMn_2O_4$ – LiPF6 in ether
Ans	**A)**	**Li- intercalated graphite-$LiCoO_2$ -$LiClO_4$ in ether**		
23.	**An advantageous use of an acid electrolyte in methanol-oxygen fuel cell is that …….**			
	A)	Product CO_2 can be removed easily	B)	Converts produced CO_2 into carbonate

	C)	Prevents diffusion of methanol into cathode	D)	Reduces CO_2 emission
Ans	**A)**	**Product CO_2 can be removed easily**		
24.	**In methanol-oxygen fuel cell, a membrane is inserted adjacent to the cathode on the inner side to ……**			
	A)	Minimize diffusion of methanol into cathode	B)	Minimize diffusion of sulphuric acid into cathode
	C)	Minimize diffusion of methanol into anode	D)	Remove produced CO_2
Ans	**A)**	**Minimize diffusion of methanol into cathode**		
25.	**Which of the following is suitable for powering portable devices such as smartphones and laptops?**			
	A)	Lead-acid battery	B)	Lithium-ion battery
	C)	Methanol-oxygen fuel cell	D)	Vanadium flow battery
Ans	**B)**	**Lithium-ion battery**		

Polymers & Analytical Techniques

26.	**A simple molecule having two or more bonding sites through which each can link to other to form a polymer chain is called ……**			
	A)	Polymer	B)	Monomer
	C)	Functionality	D)	Initiator
Ans	**B)**	**Monomer**		
27.	**The total number of functional groups or bonding sites present in a monomer molecule is called ……**			
	A)	Functionality	B)	Degree of Polymerization
	C)	Molecular Weight	D)	Polymer
Ans	**A)**	**Functionality**		
28.	**…….. is defined as the number of repeating units in a polymer chain.**			
	A)	Functionality	B)	Degree of Polymerization
	C)	Molecular Weight	D)	Monomer
Ans	**B)**	**Degree of Polymerization**		
29.	**Molecular mass of Polyethylene having degree of polymerization 100 is ……**			
	A)	1400	B)	2800
	C)	2700	D)	2000
Ans	**B)**	**2800**		
30.	**Vinyl compounds are …….**			
	A)	Bifunctional monomers	B)	Trifunctional monomers
	C)	Polymers	D)	Not example for monomers
Ans	**A)**	**Bifunctional monomers**		
31.	**The chemical process by which the monomers are converted into polymers is called …….**			
	A)	Initiation	B)	Propagation
	C)	Polymerization	D)	Substitution
Ans	**C)**	**Polymerization**		
32.	**Which of the following is a monomer?**			
	A)	Ethane	B)	Ethyl chloride
	C)	Ethene	D)	Ethyl alcohol
Ans	**C)**	**Ethene**		
33.	**Phenol is ……. monomer.**			
	A)	a monofunctional	B)	a bifunctional
	C)	a trifunctional	D)	not a
Ans	**C)**	**a trifunctional**		
34.	**The number average molecular weight is given by expression**			

	A)	Σn_i.	B)	$\Sigma n_i.M_i$
	C)	$\frac{\Sigma n_i M_i}{\Sigma n_i}$	D)	$\frac{\Sigma n_i M_i^2}{\Sigma n_i M_i}$
Ans	**C)**	$\frac{\Sigma n_i M_i}{\Sigma n_i}$		
35.	**Functionality of adipic acid is ……**			
	A)	2	B)	4
	C)	1	D)	3
Ans	**A)**	**2**		
36.	**What material is typically used to bind carbon fibres together in a composite?**			
	A)	Glass	B)	Rubber
	C)	Plastic polymer resin	D)	Metal alloy
Ans	**C)**	**Plastic polymer resin**		
37.	**Which polymer is used as the precursor for preparing carbon fibre?**			
	A)	Polyethylene	B)	Polyacrylonitrile
	C)	Polystyrene	D)	Polyvinyl chloride
Ans	**B)**	**Polyacrylonitrile**		
38.	**During the preparation of carbon fibre, at what temperature is hydrogen expelled to form aromatic rings?**			
	A)	200-300 ºC	B)	600–700 ºC
	C)	1000-1500 ºC	D)	2000-2500 ºC
Ans.	**B)**	**600-700ºC**		
39.	**Why does undoped polyacetylene behave as a semiconductor or insulator?**			
	A)	It has a high density of free electrons	B)	It is not crystalline
	C)	It has a relatively large bandgap	D)	It lacks a bandgap
Ans.	**C)**	**It has a relatively large bandgap**		
40.	**Which of the following acts as a p-type dopant for polyacetylene?**			
	A)	Sodium naphthalide	B)	Hydrogen peroxide
	C)	Polyacrylonitrile (PAN)	D)	Iodine (I_2)
Ans.	**D)**	**Iodine (I_2)**		

41.	**Conductometry is an electrochemical method of analysis based on measuring the …… of an electrolytic solution.**			
	A)	Resistance	B)	dilution
	C)	absorbance	D)	viscosity
Ans	**A)**	**resistance**		
42.	**…..…… is defined as the conductance of a solution containing one-gram equivalent weight of an electrolyte.**			
	A)	Specific conductance	B)	Equivalent conductivity
	C)	Molar conductance	D)	Fluid conductance
Ans	**B)**	**Equivalent conductivity**		
43.	**…..…… is the conductance of a meter cube of the solution.**			
	A)	Specific conductance	B)	Equivalent conductivity
	C)	Molar conductance	D)	Ionic conductance
Ans	**A)**	**Specific conductance**		
44.	**…..…… is defined as the conductance of a solution containing one mole of an electrolyte.**			
	A)	Specific conductance	B)	Equivalent conductivity
	C)	Molar conductance	D)	Molar resistance
Ans	**C)**	**Molar conductance**		
45.	**Conductance of an electrolyte is directly proportional to ……**			
	A)	Mobility and concentration of ions	B)	Resistance of the electrolyte
	C)	Voltage applied across the electrolyte	D)	Temperature of the electrolyte

Ans	**A)**	**Mobility and concentration of ions**		
46.	**Conductometry can be employed to determine equivalence point in ……..**			
	A)	Acid-base titrations	B)	Redox titrations
	C)	Complexometric titrations	D)	Precipitation titrations
Ans	**A)**	**Acid-base titrations**		
47.	**In conductometric titrations, the equivalence point is determined graphically by plotting ……..**			
	A)	Conductance vs titre values	B)	Absorbance vs concentration
	C)	Conductance vs concentration	D)	Conductance vs emf
Ans	**A)**	**Conductance vs titre values**		
48.	**In conductometric titrations of strong acid and strong base, the conductance …….**			
	A)	First decreases steeply then rises rapidly	B)	First rises rapidly then decreases steeply
	C)	Remains same throughout titration	D)	Increases gradually
Ans	**A)**	**First decreases steeply then rises rapidly**		
49.	**In the conductometric titration of ……., the conductance increases gradually till equivalence point and then rises sharply.**			
	A)	Strong acid vs strong base	B)	Strong acid vs weak base
	C)	Weak acid vs strong base	D)	Weak acid vs weak base
Ans	**C)**	**Weak acid vs strong base**		
50.	**Conductometric titrations can be used in determination of …….**			
	A)	Only strong acids	B)	Only weak acids
	C)	Neither strong nor weak acid	D)	Strong acid, weak acid, and mixture of acids
Ans	**D)**	**Strong acid, weak acid, and mixture of acids**		
51.	**Potentiometric titration involves measurement of …….**			
	A)	The potential of the indicator electrode and reference electrode	B)	The resistance of an electrolytic solution
	C)	pH of the solution	D)	Absorbance of the solution
Ans	**A)**	**The potential of the indicator electrode and reference electrode**		
52.	**Compared to chemical analysis, instrumental analysis.……**			
	A)	Are much slower	B)	Are much faster
	C)	Requires large amount of analyte	D)	Are less useful
Ans	**B)**	**Are much faster**		
53.	**Compared to chemical analysis, instrumental analysis requires ..…….**			
	A)	very large amount of analyte	B)	very small amount of analyte
	C)	no analyte	D)	no calibration of instruments
Ans	**B)**	**very small amount of analyte**		

****