SCHEME OF VALUATION
Scoring Indicator

Revision: 2015 Course Code: 1004

Course Title: Engineering Chemistry I

Qsl. No.	Scoring Indicator	Split up Score	Sub Total	Total
I 1.	Materials synthesised from the particles of nano scale	1	2	
	eg: CNT, DNA, RNA etc any one	1		
2.	Product of H^+ and OH^- ion concentration	1		
	$K_W = 10^{-14} M^2$ at 25°C	1	2	
3.	Single walled CNT (SWCNT)	1		
	Multi walled CNT (MWCNT)	1	2	
4.	removal of salt from sea water	2	2	
5.	Homogenous mixture of more than one elements out of which one is metal	1	2	
	eg: Brass, bronze, steel etc	1		
	PART B			
II 1 a)	Atom: • Smallest particle of element Molecule: • smallest particle of element or compound	1		

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Course Title: Engineering Chemistry I

Qsl. No	Scoring Indicator	Split up Score	Sub Total	Total
	• Indivisible by chemical means • divisible	1	3	3
	• unstable • stable	1		
	• eg: H, O • H_2, H_2O any three			
b)	definition of atomic no definition of mass no	1½ 1½	3	3
2 a)	• Insoluble in water • light weight • Conduct electricity etc any three	3 x 1	3	3
b)	Positive catalyst Substance increase the rate of a chemical reaction	1	1½	
	eg: Fe in haber process	½		
	Negative catalyst Substance decrease the rate of a chemical reaction	1		3
	eg: H_3PO_4 in decomposition of hydrogen peroxide	½	1½	

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Qsl. No.	Scoring Indicator	Split up Score	Sub Total	Total
3 a)	Number of parts by weight of a base to completely neutralise one equivalent of an acid	1		
	Equivalent weight = $\frac{\text{mol. wt}}{\text{acidity}}$	1	3	3
	$= \frac{106}{2} = 53$ g/mol	1		
b)	Substances used to determine end point of an acid-base titration	2		
	Phenolphthalein or methyl orange	1	3	3
4 a)	No. of ionisable OH^- ions.	1		
	eg: H_2CO_3	1	3	3
	H_2SO_4	1		
b)	a pair of acid and base differ by a proton	2		
	eg: HCl & Cl^-	1	3	3

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Qsl No	Scoring Indicator	Split up Score	Sub Total	Total
5 a)	Flow of solvent from solution side to solvent side through a semipermeable membrane when a pressure greater than osmotic pressure applied on solution side.	2	3	3
	• removed of salt from sea water • Colloidal, non colloidal impurities can be removed (any one)	1		
b)	any 3 disadvantages	3x1	3	3
6 a)	B.P is 100°C F.P is 0°C density 1g/cm³ etc	3x1	3	3
b)	$CaOCl_2 + H_2O \longrightarrow Ca(OH)_2 + Cl_2$	1		
	$Cl_2 + H_2O \longrightarrow HOCl + HCl$	1	3	3
	$HOCl \longrightarrow HCl + [O]$	1		
7 a)	Cu (60%), Zn (40%)	2	3	3
	utensils, coin etc	1		

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Qsl. No.	Scoring Indicator	Split up Score	Sub Total	Total
b)	hardness, brittleness, conductivity etc any three	3x1	3	3
	PART C			
III a)	proton, neutron & electron are called fundamental particle	2	2	
				5
	proton +1.6x10^{-19}C 1.672x10^{-27}kg	1		
	electron -1.6x10^{-19}C 9.1x10^{-31}kg	1	3	
	neutron 0 1.675x10^{-27}kg	1		
b)	Explain HiPCO	2½	5	5
	Explain CVD	2½		
c)	Homogenous - reactants and catalyst are in same phase	½		
	$SO_{2(g)} + \frac{1}{2}O_{2(g)} \xrightarrow{NO_{(g)}} SO_3$	1	2½	
	$CH_3COOC_2H_{5(l)} + H_2O \xrightarrow{H^+_{(aq)}} CH_3COOH + C_2H_5OH$	1		

SCHEME OF VALUATION
Scoring Indicator

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Qsl. No.	Scoring Indicator	Split up Score	Sub Total	Total
	heterogenous - catalyst and reactants are in different phase.	½		5
	$N_{2(g)} + 3H_{2(g)} \xrightarrow{Fe_{(s)}} 2NH_3$	1	2½	
	$SO_{2(g)} + ½\ O_{2(s)} \xrightarrow{Pt_{(s)}} SO_3$	1		
IV a)	any five applications	5x1	5	5
b)	i) Substance enhance the activity of a catalyst	2	2½	5
	eg: Mo in haber process	½		
	ii) Substance decrease the activity of a catalyst	2	2½	
	eg: As in contact process	½		
c)	• drug delivery • tumour detectors • Solar devices etc any five:	5x1	5	5

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Course Title: Engineering Chemistry I

Qsl. No.	Scoring Indicator	Split up Score	Sub Total	Total
V	a) negative logarithm of H^+ ion concentration	1		
	$[OH^-] = 1 \times 10^{-3} M$			
	$pOH = -\log [OH^-] = -\log (1 \times 10^{-3})$	1	5	5
	$= 3$	1		
	$pH + pOH = 14$	1		
	$pH = 14 - 3 = 11$	1		
	b) Solution which resists change in pH by addition of small amount of acid or alkalin in it	2	2	
	Acid buffer - weak acid and salt of its strong base	1		
	Basic buffer - weak base and salt of its strong base	1	2	5
	eg: $CH_3COOH + CH_3COONa$	½	1	
	$NH_4OH + NH_4Cl$	½		

SCHEME OF VALUATION
Scoring Indicator

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Course Title: Engineering Chemistry I

Qsl No.	Scoring Indicator	Split up Score	Sub Total	Total
5	Determination of amount of substance by using std. solution of another substance	2	2	
	$N_1V_1 = N_2V_2$	1		5
	$N_2 = 0.1N$			
	$V_2 = 20mL$			
	$V_1 = 18mL$		3	
	$N_1 = \frac{N_2V_2}{V_1} = \frac{0.1 \times 20}{18}$	1		
	$= 0.111N$	1		
VI a)	number of equivalent of solute present in 1L of solution	2	2	
	equivalent weight = 63g/mol			
	weight per litre = $\frac{0.63}{1000} \times 1000$			5
	$= 6.3g/L$	1		
	Normality = $\frac{\text{weight per litre}}{\text{equivalent mass}}$	1	3	

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Qsl. No.	Scoring Indicator	Split up Score	Sub Total	Total
	$= \frac{6.3}{63} = \underline{0.1N}$	1		
b)	• Agriculture • Sugar industry • Textile industry any 5 • effluent discharging etc	5×1	5	5
c)	Arrhenius			
	Acid - produce H^+ ion when dissolved in water	1		
	eg: HCl		2½	
	base - produce OH^- ion when dissolved in water	1		
	eg: NaOH	½		5
	Lewis			
	Acid - e^- pair acceptors	1		
	eg: BF_3		2½	
	base - e^- pair donors	1		
	eg: NH_3	½		

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Qsl. No	Scoring Indicator	Split up Score	Sub Total	Total
VII				
a)	Screening → Sedimentation → Coagulation → Filteration → Sterilization	2	5	5
	explanation	3		
b)	Cation exchange method			
	$2E-H + Ca^{2+} \rightarrow E_2Ca + 2H^+$	2		
	$2E-H + Mg^{2+} \rightarrow E_2Mg + 2H^+$			
	Anion exchange method		5	5
	$2E-OH + SO_4^{2-} \rightarrow E_2SO_4 + 2OH^-$			
	$E-OH + Cl^- \rightarrow E-Cl + OH^-$	2		
	$H^+ + OH^- \rightarrow H_2O$	1		
c)	Soft water — Hard water			
	• produce readily lather with soap solution — • doesn't produce lather with soap			
	• No wastage of soap — • Wastage of soap	5×1	5	5
	• used for drinking — • not used in drinking			
	any 5 points			

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Course Title: Engineering Chemistry I

Qsl. No.	Scoring Indicator	Split up Score	Sub Total	Total
VIII				
a)	• pH about 8, free from pathogenic bacteria, turbidity should less, soft, minerals within limit	5 x 1	5	5
b)	Permanent hardness water contain Cl^-, SO_4^{2-} of Calcium and magnesium ion	2½		
	Temporary hardness Water contain HCO_3^- of calcium and magnesium	2½	5	5
c)	Boiling $Ca(HCO_3)_2 \xrightarrow{\Delta} CaCO_3 + CO_2 + H_2O$ explain	1 ½	2½	
	clark's process $Ca(HCO_3)_2 + Ca(OH)_2 \longrightarrow 2CaCO_3 + 2H_2O$ explain	1 ½	2½	5

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Scoring Indicator

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Course Title: Engineering chemistry I

Qsl. No.	Scoring Indicator	Split up Score	Sub Total	Total
8 a)	Diagram Explanation	2 3	5	5
b)				

	Cast Iron	wrought	Steel
hardness	hard	soft	intermediate
Brittleness	brittle	not brittle	not brittle
ductility	not ductile	ductile	ductile

any five 5x1 5 5

c) No wastage of material
rate of production is high
highly skilled labours are not required
quick and cleaner operation
good surface finished materials can be prepared.
any five 5x1 5 5

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Qsl. No.	Scoring Indicator	Split up Score	Sub Total	Total
	OR			
X				
a)	Atomization & reduction, mixing, compacting, pre-sintering, sintering explanation	2½	5	5
b)	Si, S, N, O, P, Mn etc any two effects	2½ 2½ 2½	5	5
c)	quenching - steel is heat at high temperature and suddenly cooled in water or oil	1½	2½	
	steel become hard	1		
	Nitriding - steel is heated in the presence of ammonia and slowly cooled.	1½	2½	5
	surface hardness increases underwater for industrial uses	1		