Scoring Indicators

(Scheme of valuation)

Revision: 2015		Course Code: 2004			
Course Title: ENGINEERING CHEMISTRY II					
Qn No.	Scoring Indicators	Split Score	Sub Total	Total Score	
	PART A			·	
I 1.	Electrons in an atom occupy the available orbitals in the increasing order of energy by obeying Pauli's exclusion principle and Hund's rule of maximum multiplicity.	2	2	2	
I 2.	Cells in which the chemical reactions taking place can be reversed by passing electricity. Eg. Lead storage battery or Nickel- Cadmium cell.	1	2	2	
I 3.	Hexamethylene diamine and adipic acid	2	2	2	
I 4.	Primary fuel: eg- wood, charcoal, peat, lignite, natural gas etc Secondary fuel: eg: kerosene, petrol, diesel, water gas etc	1	2	2	
I 5.	$N(Z=7) = 1s^2 2s^2 2p^3$ $Cl(Z=17) = 1s^2 2s^2 2p^6 3s^2 3p^5$	1 1	2	2	

		PART B			
II	Orbit				
1.	1.	Orbit is a well defined circular path around the nucleus.			
	2.	It represents the planar motion of an electron around the nucleus.			
	3.	Orbits are circular			
	4.	Orbits do not have any directional characteristics.			
	5.	Concept of an orbit is not in accordance with the wave character of electrons.			
	6.	Maximum no. of electrons in any orbit is given by $2n^2$.			
	Orbita	I i i i i i i i i i i i i i i i i i i i			
	1.	Three dimensional space around the nucleus where the probability of finding electron is maximum.			
	2.	It represents the three dimensional motion of electron around the nucleus.			
	3.	Different orbitals have different shapes.	4×1½	6	6
	4.	All orbitals except s-orbitals have directional characteristics.			

	 5. Concept of an orbital is in accordance with the wave character and uncertainty principle. 6. The maximum no. of electrons in any orbital is 2. Any 4 points of orbit and orbital 			`
1I 2.	Corrosion is considered as an electrochemical process. Galvanic cells are set up between dissimilar parts on the metal surface in presence of electrolytic solution formed by wet air.			
	Pure part on the metal surface act as anode and impure region act as cathode.	1	6	6
	Moisture containing dissolved oxygen or carbon dioxide on its surface take the role of electrolytic solution.	1		TITLE OF THE PROPERTY OF THE P
	Anode reaction	1		
	Cathode reaction	Î		
	Net reaction	1		
3.	 When electric current is passed through molten sodium chloride the following reactions occur Na⁺ ions move towards cathode, lose their charge by gaining electrons and change to neutral atoms Cathode reaction Cl⁻ ions move towards anode lose their charge by loss of electrons and change into neutral atoms. Anode reaction Diagram 	1 1 1 1 2	6	6
1I 4.	 Tetravalency of carbon Catenation capacity Strength of C-C bond Ability to form multiple bonds Ability to exhibit isomerism Capacity to form bonds with nonmetals like O, N, P, S and halogens. 	6 x l	6	6
II 5.	 Monomer- isoprene (2-methyl-1,3-butadiene) Natural rubber has low strength and elasticity Its quality is very poor It is easily damaged by atmospheric oxidation It cannot be used beyond the temperature range 10-50°C In hot weather it becomes soft and sticky and in cold weather it becomes hard and brittle The properties of natural rubber can be improved by a process called vulcanisation Any 5 points 	1 5x1	5	6

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6.	Acid rain: The phenomenon of the presence of excessive acids in rain water is called acid rain. This happens when the air is polluted with acidic oxides of sulphur and nitrogen given out from automobiles and industry. These oxides are highly soluble in water and mix with rain water to form acid rain. Acid rain may cause damages to buildings, statues, trees, crops etc. Green house effect: It is the phenomenon of heating up of earth's atmosphere due to the absorption of infrared radiations by green house gases like CO ₂ , water vapour, methane etc. If the green house gases are very less or totally absent in earth's atmosphere, the average temperature of the earth's atmosphere is less than zero. If the concentration of green house gases is very large, they may trap too much heat which will make earth unsuitable for life.	3	6	6
7.	Thermal cracking: Cracking done in the absence of catalyst is called thermal cracking. Thermal cracking requires high temperature (470-530°C) and high pressure when random cleavage of C-C bond take place and lower alkanes result. Eg: Decane gives octane and ethene. Catalytic cracking: In this process heating is done at a lower temperature in presence of catalyst silica and alumina mixture to produce gasoline. The use of catalyst increases the rate of cracking and enables to carry out the reaction at a lower temperature than	3	6	6
	required for thermal cracking.		<u> </u>	L
	PART C			
III	Chemical bond: The attractive force which holds the various	1	<u> </u>	r '
a.	constituents like atoms, ions etc together in different chemical species is called a chemical bond. Covalent bond: The bond formed between two atoms by mutual sharing of electrons between them so as to complete their octets. A covalent bond is formed either between two atoms of same element having same electronegativity or two atoms of different elements having slightly different electronegativities. Explanation of formation of covalent bond with any one eg. Ionic bond: Ionic bond is formed by the transfer of one or more valence electrons from one atom to another. Ionic bond is the electrostatic force of attraction between the oppositely charged ions. Explanation of formation of ionic bond with any one eg.	3	9	
III	Merits			15
b.	 Bohr theory was able to give a more satisfactory picture about the structure of atom. It helped to calculate the energy of electrons in an orbit and also the radius of an orbit. It could explain the emission and absorption spectra of 	3x1		

	hydrogen atom.	T''		
	Demerits		6	
	1. It failed to predict the energy states and the spectrum of			
	more complicated atoms with many electrons.	3x1		
	2. It doesnot mention enutling about chemical harding of			
	3. It does not mention anything about chemical bonding of			ľ
***	atoms.	<u> </u>	-	-
IV	A set of 4 numbers called quantum numbers are introduced to	1	-	
a.	designate the principal energy level, sub energy level, the orbital	I		
	and spin of an electron in an atom.			
	Principal quantum number: significance	2	9	
-	Azimuthal quantum no. : significance	2		
	Magnetic quantum no.: significance	2		
	Spin quantum no. : significance	2		
IV				15
b.	Shape of S- orbital	2		'
	Shape of Px, Py and Pz orbitals	4	6	
V			-	
	Deinainla and evaluin-	6		***************************************
a.	Principle and working	U	9	Yes
1				1
		3		15
	Diagram		1	
				•
V				
b.	Any three differences	6	6	
¥7¥				
VI	Galvanic cells in which chemical energy of fuel is		}	
a.	electrochemically converted into electrical energy	2		
	diconsolitioning converted into ciccurcal chargy		9	
	Hydrogen oxygen fuel cell: Principle and working	5		
	Diagram	2		15
VI				-
b.	Working	2		
	Anode-anodic reaction with equation	1		
	Cathode -reaction at cathode with equation	1	6	
-	Diagram	2	ļ	
VII	Plastia Definition and the	,		
a.	Plastic – Definition, properties, example	3		
	Fiber - Definition, properties, example	3	9	
	Elastomers - Definition, properties, example	٥		
VII		<u> </u>		.
b.	An atom or group of atoms which determine the properties of an			THE STATE OF THE S
	organic compound.	2	6	
L			<u>L</u>	<u> </u>

	Carboxylic acidCOOH	2		15
	AlcoholOH	2		
VIII		-		
а.	Soda Glass-Composition and any two uses Borosilicate Glass - Composition and any two uses Safety Glass - Composition and any two uses	3 3 3	9	
b.	higher bandwidths than metal wire cables 2. Signals travel along them with lesser transmission loss 3. Optical fibres do not conduct electricity, preventing problems with ground loops and conduction of lightning 4. Light can be kept within the fibre by the phenomenon of total internal reflection Any 4 advantages	4x1½	6	15
IX	Calorific value: Definition	1		
a.	Water gas: composition and calorific value Producer gas: composition and calorific value Gobar gas: composition and calorific value Natural gas: composition and calorific value	2 2 2 2	9	To a second seco
IX	Minimization of waste and unwanted side products at			15
b.	 source. Complete conversion of raw materials in to the required products. Use of safe, environment friendly substances, including solvents, whenever possible. Biodegradability of the products. Or any 4 points 	4x1½	6	
X	Brief explanation of the following regions			
a.	Troposphere Stratosphere Mesosphere Thermosphere Exosphre	2 2 2 2 1	9	
X b.	 High calorific value Low moisture content Moderate ignition temperature Smooth and steady burning Easy to control and transport Low cost and high availability Or any 6 points 	6x1	6	15