

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 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 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 1.	<p>Orbit</p> <ol style="list-style-type: none"> Orbit is a well defined circular path around the nucleus. It represents the planar motion of an electron around the nucleus. Orbits are circular Orbits do not have any directional characteristics. Concept of an orbit is not in accordance with the wave character of electrons. Maximum no. of electrons in any orbit is given by $2n^2$. <p>Orbital</p> <ol style="list-style-type: none"> Three dimensional space around the nucleus where the probability of finding electron is maximum. It represents the three dimensional motion of electron around the nucleus. Different orbitals have different shapes. All orbitals except s-orbitals have directional characteristics. 	4×1½	6	6

	<p>5. Concept of an orbital is in accordance with the wave character and uncertainty principle.</p> <p>6. The maximum no. of electrons in any orbital is 2.</p> <p>Any 4 points of orbit and orbital</p>			
II 2.	<p>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.</p> <p>Pure part on the metal surface act as anode and impure region act as cathode.</p> <p>Moisture containing dissolved oxygen or carbon dioxide on its surface take the role of electrolytic solution.</p> <p>Anode reaction</p> <p>Cathode reaction</p> <p>Net reaction</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	6	6
II 3.	<p>When electric current is passed through molten sodium chloride the following reactions occur</p> <ul style="list-style-type: none"> • 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 	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p>	6	6
II 4.	<ol style="list-style-type: none"> 1. Tetravalency of carbon 2. Catenation capacity 3. Strength of C-C bond 4. Ability to form multiple bonds 5. Ability to exhibit isomerism 6. Capacity to form bonds with nonmetals like O, N, P, S and halogens. 	6 x 1	6	6
II 5.	<p>Monomer- isoprene (2-methyl-1,3-butadiene)</p> <ul style="list-style-type: none"> • 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 <p>Any 5 points</p>	<p>1</p> <p>5x1</p>	<p>1</p> <p>5</p>	6

	hydrogen atom. Demerits 1. It failed to predict the energy states and the spectrum of more complicated atoms with many electrons. 2. It could not explain Stark and Zeeman effects. 3. It doesnot mention anything about chemical bonding of atoms.	3x1	6	
IV a.	A set of 4 numbers called quantum numbers are introduced to designate the principal energy level, sub energy level, the orbital and spin of an electron in an atom. Principal quantum number: significance Azimuthal quantum no. : significance Magnetic quantum no.: significance Spin quantum no. : significance	1 2 2 2 2	9	15
IV b.	Shape of S- orbital Shape of Px, Py and Pz orbitals	2 4	6	
V a.	Principle and working Diagram	6 3	9	15
V b.	Any three differences	6	6	
VI a.	Galvanic cells in which chemical energy of fuel is electrochemically converted into electrical energy Hydrogen oxygen fuel cell : Principle and working Diagram	2 5 2	9	15
VI b.	Working Anode-anodic reaction with equation Cathode -reaction at cathode with equation Diagram	2 1 1 2	6	
VII a.	Plastic – Definition, properties , example Fiber - Definition, properties , example Elastomers - Definition, properties , example	3 3 3	9	
VII b.	An atom or group of atoms which determine the properties of an organic compound.	2	6	

	Carboxylic acid - -COOH	2		15
	Alcohol- -OH	2		
VIII				
a.	Soda Glass-Composition and any two uses	3	9	15
	Borosilicate Glass - Composition and any two uses	3		
	Safety Glass - Composition and any two uses	3		
VIII				
b.	1. It permits transaction of signals over longer distances and at 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				
a.	Calorific value: Definition	1	9	15
	Water gas : composition and calorific value	2		
	Producer gas: composition and calorific value	2		
	Gobar gas: composition and calorific value	2		
	Natural gas: composition and calorific value	2		
IX				
b.	1. Minimization of waste and unwanted side products at source. 2. Complete conversion of raw materials in to the required products. 3. Use of safe, environment friendly substances, including solvents, whenever possible. 4. Biodegradability of the products. Or any 4 points	4x1½	6	15
X				
a.	Brief explanation of the following regions Troposphere Stratosphere Mesosphere Thermosphere Exosphre	2 2 2 2 1	9	
X				
b.	1. High calorific value 2. Low moisture content 3. Moderate ignition temperature 4. Smooth and steady burning 5. Easy to control and transport 6. Low cost and high availability Or any 6 points	6x1	6	15