(2 Hours)

[Total Marks: 60]

Note:

- 1. Question No.1 is compulsory
- 2. Attempt any **Three** Questions from the remaining Five Questions
- 3. Figures to the right indicate full marks
- 4. Atomic Weights: C = 12, H = 1, O = 16, N = 14, S = 32, Cl = 35.5
- Q1 Attempt any **Five** of the following:

15

- a. What are fuels? Give characteristics of good fuel.
 - b. How does position of metal in galvanic series affect corrosion.
 - c. Explain 'Prevention of waste' principle in green chemistry.
 - d. Define Spectroscopy and Electromagnetic spectrum.
 - e. Give the principle of cathodic protection. What are the two types of cathodic protection?
 - f. A cell is constructed from Ni / Ni⁺² and Cu⁺² /Cu half cells. Given $E^0Ni = -0.257$ V and $E^0Cu = 0.337$ V. Find out the standard potential of the cell.
 - g. A sample of coal has the following composition by mass:
 C = 85%, H = 6%, O = 8%, S = 0.5% and Ash = 0.5%. Calculate HCV using Dulong's Formula.

Q2a	What is Electrochemical corrosion? Explain Hydrogen evolution mechanism with the help ofdiagram.	6
b	Define Green Chemistry. Calculate the percentage atom economy for the following reaction with respect to allyl chloride. $CH_3-CH=CH_2 + Cl_2 \rightarrow Cl-CH_2-CH=CH_2 + HCl$ Propene Allyl chloride	5
C	What is knocking. Explain the role of anti-knocking agents.	4
Q3a	What is oxidation corrosion. Name the different types of oxide layer formed and state which oxidelayers are non-protective in nature. Explain with suitable examples.	6
b	3.2 gm of coal in Kjeldahl's experiment evolved NH_3 gas was absorbed in 40 ml of 0.5 N H_2SO_4 . After absorption the excess acid required 16 ml of 0.5 N NaOH for complete neutralization. 2.5 gms of coal sample in quantitative analysis gave 0.42 gm BaSO4. Calculate the % N and S.	5
c C	What is Electrochemistry? Differentiate between Electrolytic cell and Galvanic cell.	4
Q4a	Proximate analysis consist of determinations of which contents in the coal. Calculate the weight of air required for complete combustion of 1Kg coal containingC=65%, H=4%, O=5%, S=2%, N=4%, moisture=10% and remaining ash.	6
b	Explain conventional and green route method of manufacturing of Carbaryl.	5
Ę	By this method which principle of Green Chemistry is shown?	
c	How is the rate of corrosion influenced by:	4
	(i) \sim pH of the medium	

i) Relative areas of cathode and anode parts.

Page 1 of 2

Paper / Subject Code: 29713 / Engineering Chemistry - II

Q5a	Give in tabular form the relation between electromagnetic spectrum, types of spectroscopy and corresponding energy changes.	6
b	Explain trans-esterification method for synthesis of bio- diesel. Mention advantages of Bio-diesel.	5
c	What are metallic coatings? Distinguish between galvanizing and tinning.	4
Q6a	What are reference electrodes? Give construction and working of any one secondary reference electrode.	6
b	 (i) What is unleaded petrol? Give the advantages of oxygenates. (ii) Define Octane and Cetane number, also give its significance. 	5

c What are selection rules? Explain any two selection rules.

Page 2 of 2