[Time: 2 Hours] **[Total Marks:60]**

Please check whether you have got the right question paper.

N.B: 1. Question.No.1 is compulsory.

2. Attempt any three questions out of remaining five

3.Figure to the right indicates full marks.

4 Atomic weights C=12,S=32,N=14,H=1,O=16,Cl=35.5.

1		Answer **any five** from the following	**15**
	(a)	Define octane number and write its significance.	
	(b)	What is the difference between anodic and cathodic coatings?	
	(c)	Calculate higher calorific value of a coal sample containing C=85%,H=1%,N=1.5%,O=5%,S=0.4% and remaining being ash.	
	(d)	Write the composition, properties and uses of commercial brass.	
	(e)	Explain the principle "Inherently Safer Chemistry of Accident Prevention" in green chemistry.	
	(f)	Write the classification of composite materials.	
	(g)	What are functions of pigments in paints?	
2	(a)	Define corrosion. Explain the mechanism of wet corrosion with respect to neutral and alkaline media.	**6**
	(b)i)	1.4 gm of coal sample on combustion gave 0.3 gm of barium sulphate precipitate. Calculate the percentage of sulphur in the sample.	**3**
	ii)	What are the industrial applications of super critical CO_2?	**2**
	(c)	What are large particle reinforced composite materials? Explain with the help of examples.	**4**
3	(a)	What is cracking? Explain in detail fixed bed catalytic cracking.	**6**
	(b)i)	What are shape memory alloys ?What are their applications ?	**3**
	ii)	How does the presence of humidity affect the rate of corrosion?	**2**
	(c)	Calculate the percentage atom economy of the following reaction with respect to the product allyl chloride	

$$CH_3\text{-}CH{=}CH_2 + Cl_2 \rightarrow Cl\text{-}CH_2\text{-}CH{=}CH_2 + HCl$$

Allyl Chloride

4	(a)	What is anodic protection method of corrosion control? Explain with the help of a neat diagram .	**6**
	(b)i)	What are the industrial applications of the products from natural materials ?	**3**
	ii)	What are the functions of matrix phase of composite materials?	**2**
	(c)	Write a note on heat resisting steel.	**4**
5	(a)	A sample of coal was found to contain C=90%,O=5%,H=1%,S=0.5% and remaining being nitrogen.Calculate weight and volume of air required for complete combustion of 1 kg of coal sample.(M.W.of air=28.949)	**6**
	(b)i)	"The noble metals do not undergo corrosion" .Justify the statement.	**3**
	ii)	What are the applications of fuel cell?	**2**
	(c)	Explain with suitable equations ,conventional and green synthesis of adipic acid.	**4**
6	(a)	What is powder metallurgy? Explain powder injection moulding method with the help of a neat diagram.	**6**
	(b)i)	What are the characteristics of composite materials ?	**3**
	ii)	What are the characteristics of a paint film?	**2**
	(c)	What is biodiesel? Write the advantages of biodiesel.	**4**