

(2 Hours)

[Total Marks : 75]

**N.B. :** (1) Question No. 1 is compulsory.

(2) Attempt any four from remaining six questions.

(3) **Figures** to the right indicate full marks.

(4) Atomic wt :- C = 12, H = 1, O = 16, S = 32, N = 14, Cl = 35.5, Ba = 137.3.

1. Solve any five from the followings :-

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(a) What is season cracking.

(b) Give composition, properties and uses of soft solders.

(c) A sample of coal contains - C = 70%, O = 23%, H = 5%, S = 1.5%, N = 0.4%, ash = 0.1%. Calculate G.C.V. and N.C.V. of this fuel.

(d) What are fiber composites.

(e) What are green fuel.

(f) Give significance of proximate analysis.

2. (a) Explain the direct chemical corrosion.

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(b) 1.5 gms of sample of coal was taken in crucible for C and H estimation, by combustion method. The increase in weight of tube containing CaCl<sub>2</sub> and bulb-containing KOH, was found to be 1.25 gms and 4.88 gms. respectively. Calculate % C. and H.

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(c) Giving conventional and greener route for production of adipic acid, explain related green chemistry principle in this case.

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3. (a) Explain method of obtaining Biodiesel from vegetable oil? Give advantages of Biodiesel.

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(b) 100 ml. of natural solution containing 0.2 gm of Cu<sup>2+</sup> ion electrolysed till entire copper was deposited. The current strength was 1.2 amperes and Volume of solution maintained at 100 ml. Assuming 100% efficiency. Calculate time taken for deposition of copper.  
(At wt. of copper = 63.58).

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(c) Explain the principle of use of safer solvent and reaction condition in green chemistry with suitable examples.

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4. (a) Calculate weight of air needed for complete combustion of 1 kg of coal containing C = 72%, H = 10%, O = 9%, N = 3% and remaining being ash.

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(b) Describe adsorption and catalytic properties of Zeolite.

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(c) What is powder metallurgy? How metal powders are prepared.

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5. (a) Give the functions of matrix phase in composite materials with their properties.

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(b) What is cracking? Explain advantages of catalytic cracking over thermal cracking.

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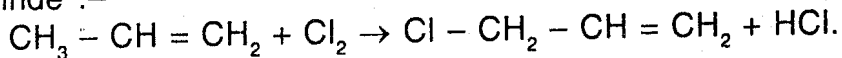
(c) The composition of gas was found to be H<sub>2</sub> = 10%, CH<sub>4</sub> = 20%, C<sub>2</sub>H<sub>6</sub> = 16%, N = 6%, CO = 18%, CO<sub>2</sub> = 22%. O<sub>2</sub> = rest. Calculate volume of air required for 1 m<sup>3</sup> of this gas.

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6. (a) Discuss the corrosion due to combination of metals of different electrode potentials. 5  
(b) What are ceramic powder ? Explain method of manufacturing any one ceramic powder. 5  
(c) Define cetane and octane number. 5
7. (a) How does a catalyst affect establishment of equilibrium state and activation energy of reaction ? Explain with necessary graph. 5  
(b) Write characteristics of good fuels. 5  
(c) Which are main constituents of varnishes. Write their function. 5

**OR**

Calculate the percentage atom economy for following reaction with respect of Allylchloride :-



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