

- (b) Explain conventional and green chemistry route of production of Indigo dye. Highlight the green chemistry principle involved. 5
- (c) How do the following factors affect the rate of corrosion ? 4
- (i) Relative areas of anodic and cathodic parts.
 - (ii) Position of metal in galvanic series.
4. (a) What are alloy steels? Explain special effects of the following metals on properties of alloy steels. 6
- (i) Chromium (ii) Nickel (iii) Cobalt (iv) Tungsten
- (b) Explain differential aeration corrosion with the help of a suitable example. 5
- (c) Explain laminar composites with suitable example. 4
5. (a) What is biodiesel ? Explain method to obtain biodiesel from vegetable oil. What are the advantages of biodiesel ? 6
- (b) What is Powder metallurgy ? Explain Powder Injection moulding method of compaction. 5
- (c) Define matrix phase of composite material. State functions of matrix phase. 4
6. (a) What is the principle of cathodic protection method of corrosion control ? Explain Sacrificial anodic protection method. 5
- (b) 2.5 g. of a coal sample was analysed for nitrogen content by Kjeldahl's method. The liberated ammonia required 12.7ml of 0.5N H_2SO_4 solution for neutralization. In a separate experiment, using Bomb calorimeter, 1.5 g of coal sample gave 0.28g of $BaSO_4$. Calculate percentage Nitrogen and Sulphur in the sample. 5
- (c) How are plain carbon steels classified based on carbon content ? What are the drawbacks of plain carbon steels? 5
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