



## PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss cationic polymerization mechanism in detail. (8)  
 (ii) Distinguish thermoplastics and thermosetting plastics. (8)

Or

- (b) (i) Explain any four properties of polymers in detail. (8)  
 (ii) Discuss the preparation, properties and uses of Nylon 6:6. (8)
12. (a) (i) Derive Gibbs-Helmholtz equation and Explain. (8)  
 (ii) Compute free energy change when 5 moles of an ideal gas expands reversibly and Isothermally at 300 K from an initial volume of 50 L to 1000 L. (8)

Or

- (b) (i) What meant by Vant Hoff's reaction isotherm? Derive the expression for a reaction isotherm of the general reaction:  
 $aA + bB \rightarrow cC + dD$ . (8)  
 (ii) Discuss the criteria for chemical reaction to be spontaneous. (8)
13. (a) (i) State and explain the laws of Photochemistry in detail. (8)  
 (ii) Explain the principle and instrumentation of UV-Visible spectroscopy with neat block diagram. (8)

Or

- (b) (i) Explain the principle and instrumentation of IR spectroscopy with a neat block diagram. (8)  
 (ii) Discuss  
 (1) Fluorescence and (4)  
 (2) Phosphorescence in detail. (4)
14. (a) (i) Draw a neat one component water system and explain in detail. (8)  
 (ii) Discuss the heat treatment of steel in detail. (8)

Or

- (b) (i) Draw a neat zinc - magnesium system and explain in detail. (8)  
 (ii) Discuss composition, properties and uses of any two non-ferrous alloys. (8)

15. (a) (i) How are carbon nanotubes are synthesised? Explain in detail. (8)  
(ii) Distinguish molecules, nanoparticles and bulk materials. (8)

Or

- (b) (i) Discuss various types of synthesis involved in the preparation nanomaterials. (8)  
(ii) Explain  
(1) nano cluster (4)  
(2) nanowire with examples. (4)
-