

**B.N. Bandedkar College of Science, Thane**

**F.Y.B.Sc - First Semester End Examination October 20 11**

**USCH102**

Duration 2 hrs

Marks-60

N.B. All Questions are compulsory.  
Figures to right indicate full marks.

- Q.1) A) A heat engine operating between 300K and 650K absorbs 50KJ at higher temperature. Calculate (a) the efficiency of the engine (b) work done. 3
- B) Attempt **ANY THREE** of the followings. 12
- (a) State the first law of thermodynamics and obtain the mathematical expression for the law.
- (b) What is meant by spontaneous processes? Discuss some spontaneous processes giving their characteristics.
- (c). Describe the Carnot cycle.
- (d).State the significance of Helmholtz and Gibbs free energies.
- (e). Describe the rules for the determination of significant figure in a measured value
- Q2) A)Give the important uses of Methane. 3
- B)Attempt **ANY THREE** of followings. 12
- a) Give the various methods of formation of carbanion.
- b) Calculate the angle strain of following molecule.  
i) cyclopropane ii) cyclobutane.
- c) Explain  $SN^1$  mechanisms and give it's energy profile diagram.
- d) Explain the acids and bases on the basis of following concept.  
i) Lowry-Bronstead ii) Lewis
- e) Write a note on following fraction obtained after refining of Raw Petroleum.  
i) Gasoline ii) Kerosene
- Q 3) A) Explain CsF is most electronegative in nature. 3

- B) Attempt **ANY THREE** of the followings. 12
- a) What is hybridization, Explain hybridization in  $\text{BF}_3$ .
  - b) Define Coordinate covalent bond. Explain bond between  $\text{NH}_3$  &  $\text{BF}_3$ .
  - c) With suitable example, explain Born Haber cycle.
  - d) What is VSEPR theory, Explain the structure of  $\text{ClF}_3$ .
  - e) Explain the energies involved in covalent bond formation.
- Q 4) A)
- (a). Distinguish between isothermal and adiabatic processes. 2
- OR
- (b). Give important characteristics of the function entropy. 2
  - (c). Define significant figures. 2
  - (d). Round off at the five: 1
- (i) 23.73541      (ii) 0.00565
- B)
- a) Explain carbon acids with example. 2
- OR
- b) Assign the formal charge on 'N' in  $\text{NH}_3$  molecule. 2
  - c) Define Heterolytic and Homolytic bond fission. 2
  - d) Draw the structure carbocation. 1
- C)
- a) Explain sigma bond. 2
- OR
- b) What are the limitations of the formations of ions? 2
  - c) Define, ionic bond & electron affinity. 2
  - d) Define Coordinate covalent bond. 1

\*\*\*\*\*