LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

U.G. DEGREE EXAMINATION – **ALLIED**

THIRD SEMESTER – **NOVEMBER 2024**

UCH 3401 – APPLIED CHEMISTRY FOR PHYSICS

Date: 15-11-2024 Dept. No. Max. : 100 Marks

Time: 09:00 am-12:00 pm

SECTION A

Answer ANY FOUR of the following **4 x 10 = 40 Marks**

1. Describe the BCS theory and the concept of Cooper pairs in superconductivity.
2. Outline the various applications of superconducting materials in modern technology.
3. Interpret the DTA curves of calcium oxalate monohydrate and sulphur.
4. Explain the phase diagram of water and interpret the key points.
5. Derive Gibbs' phase rule and explain its significance in phase transitions.
6. Compare and contrast the direct and electrochemical corrosion in terms of their mechanisms.
7. Discuss the role of corrosion inhibitors in reducing the rate of corrosion.
8. Classify lipids and describe their main functions in biological systems.

SECTION B

Answer ANY THREE of the following **3 x 20 = 60 Marks**

9. a. Discuss the classification of liquid crystals with relevant examples. (10)
   b. What is single harmonic generation? Discuss its significance in nonlinear optics. (10)
10. a. Explain the TGA analysis of calcium oxalate monohydrate and silver nitrate. (10)
    b. Compare the techniques of TGA, DTG and DTA in terms of principles and instrumentation. (10)
11. a. Describe the lead-silver system and interpret its phase diagram. (10)
    b. Discuss the phase diagram of sulphur, highlighting the phase transitions involved. (10)
12. a. Compare the effectiveness of cathodic and anodic protection in corrosion prevention. (10)
    b. Explain the methods of modifying the corrosion environment to control corrosion. (10)
13. a. Discuss the applications and limitations of carbohydrate detection tests. (10)
    b. Draw the structures of (i) Glucose (ii) Sucrose and (iii) Starch. (10)
14. a. Discuss the factors that influence thermograms in thermal analysis. (10)
    b. Define the following with an example. (10)
    (i) RM value (ii) Acid value (iii) Zwitter ion (iv) Essential amino acids.
