# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**B.Sc.** DEGREE EXAMINATION – **PHYSICS**

THIRD SEMESTER – **NOVEMBER 2023**

**UCH 3401 – APPLIED CHEMISTRY FOR PHYSICS**

Date: 08-11-2023 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

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| | **SECTION A - K1 (CO1)** | |
| | **Answer ALL the Questions -** | **(10 x 1 = 10)** |
| **1.** | **Define the following terms** | |
| a) | Cooper pairs | |
| b) | Thermogram | |
| c) | Component | |
| d) | Galvanic corrosion | |
| e) | Acid value | |
| **2.** | **Fill in the blanks** | |
| a) | The maximum current that can flow through a superconducting material without resistance is known as the _____ current. | |
| b) | During the TGA of AgNO3, the mass loss represents the _____ of the silver nitrate. | |
| c) | In the phase diagram of water, the point where all three phases coexist is known as the _____. | |
| d) | Tarnishing of silver ware is an example of _____. | |
| e) | The _____ value measures the degree of unsaturation in oils and fats. | |
| | **SECTION A - K2 (CO1)** | |
| | **Answer ALL the Questions** | **(10 x 1 = 10)** |
| **3.** | **Match the following** | |
| a) | BCS theory - Glucose | |
| b) | DTG - Superconductivity | |
| c) | Sulphur - Organic coating | |
| d) | Corrosion Inhibitor - (dW/dT) vs temperature | |
| e) | Reducing sugar - One component system | |
| **4.** | **True or False** | |
| a) | The Josephson effect involves the flow of current between two superconductors separated by a vacuum. | |
| b) | DTA measures change in mass as a function of temperature or time. | |
| c) | Phase diagrams provide information about the temperature-pressure conditions at which different phases coexist. | |
| d) | Corrosion is exactly the reverse of extraction of metals. | |
| e) | Alanine is an example of non-reducing sugar. | |
| | **SECTION B - K3 (CO2)** | |
| **Answer any TWO of the following** | | **(2 x 10 = 20)** |
| 5. | (a) List five practical uses where superconducting materials are employed.<br>(b) Differentiate hard and soft superconductors. | (5 + 5) |

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| 6. | Discuss the principle and instrumentation involved in TGA. |
| 7. | What is eutectic mixture? Sketch and explain the phase diagram of lead-silver system. |
| 8. | (a) Elaborate the role of corrosion inhibitors in protecting metals from corrosion.<br>(b) Define: Saponification value and Zwitterion. (6+4) |

**SECTION C – K4 (CO3)**

| **Answer any TWO of the following** | **(2 x 10 = 20)** |
|---|---|
| 9. | Discuss the characteristics of smectic and nematic crystals. |
| 10. | (a) Analyse and interpret the TGA curves of calcium oxalate monohydrate.<br>(b) Explain the sacrificial anodic protection method of corrosion with a neat sketch. (4+6) |
| 11. | Describe the phase diagram of water system with a diagrammatic representation. |
| 12. | Explain the classification of lipids with examples. |

**SECTION D – K5 (CO4)**

| **Answer any ONE of the following** | **(1 x 20 = 20)** |
|---|---|
| 13. | (a) Write a note on non-linear optics and its uses. (10+10)<br>(b) Discuss the various factors that can influence the shape and characteristics of a thermogram. |
| 14. | (a) State and derive Gibbs phase rule.<br>(b) Explain the classification of amino acids with examples for each category.<br>(c) Write the Benedict's and Fehling's test for carbohydrates. (7+7+6) |

**SECTION E – K6 (CO5)**

| **Answer any ONE of the following** | **(1 x 20 = 20)** |
|---|---|
| 15. | (a) What are liquid crystals? Explain the characteristics of cholesteric and columnar crystals.<br>(b) Sketch and explain the DTA curve of sulphur and calcium oxalate monohydrate. (10+10) |
| 16. | (a) Draw and discuss the phase diagram for the sulphur system.<br>(b) Discuss the direct and electrochemical corrosion with an example.<br>(c) Compare essential and non-essential fatty acids. (10+5+5) |

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