LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **CHEMISTRY**

THIRD SEMESTER – **NOVEMBER 2014**

CH 3876 / CH 3875 - MATERIAL SCIENCE

Date : 10/11/2014 Dept. No. Max. : 100 Marks

Time : 09:00-12:00

Part-A

Answer all the questions. Each question carries two marks: ***10x2=20***

1. What are composite materials? How can their Young's modulus be calculated?
2. Explain how the Poisson's ratio varies between an elastic and plastic material.
3. Draw the block diagram of a SEM.
4. Define space lattice and basis.
5. Write the equation for reciprocal lattice vector.
6. State Curie-Weiss law.
7. What is cooper pair of electrons?
8. Mention any two methods commonly used in wastewater treatment.
9. Define critical current in superconductivity.
10. Mention any two applications of ferroelectrics.

Part-B

Answer any eight questions. Each question carries five marks: ***8x5=40***

11. Discuss the essential features of Rubber-like elasticity and hence obtain the equation of state of the rubbery material.
12. Draw the schematic diagram of TEM and discuss its functioning.
13. Explain the high temperature growth of crystals employing Czochralski method.
14. Write the equations for H_B, H_M, H_V, and H_K hardness numbers.
15. Describe the neutron diffraction method for structure determination.
16. Derive the relation connecting Poisson's ratio with different moduli of elasticity.
17. What are metal-excess defects? Explain.
18. Discuss the importance of p-n junction in transistors.
19. What are piezoelectric materials? Discuss any two applications.
20. Briefly discuss two types of dielectric breakdown.
21. Explain the sol-gel and modified sol-gel methods of preparation of nanomaterials.
22. How is Honda Cell helpful for the splitting up of water? Explain.

Part-C

Answer any four questions. Each question carries ten marks: ***4x10=40***

23. Explain the structure of silica gel. Discuss the various experimental procedures for growing crystals via a gel medium.
24. Draw the block diagrams and describe the procedure for recording and analyzing the X-ray diffractogram of a crystalline powder.
25. Discuss the formation of symmetry elements by different combinations based on symmetry considerations.
26. Explain the mechanism of photocatalysis and its application in environmental remediation.
27. Explain the phenomenon of hysteresis exhibited by ferromagnets.
28. Define NLO. Explain any two phenomena in NLO.

****