

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – PHYSICS

FIFTH SEMESTER – NOVEMBER 2019

PH 5408 – MATERIALS SCIENCE

Date: 07-11-2019

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

PART - A

ANSWER ALL QUESTIONS

(2×10= 20)

1. Give examples of organic polymers and ceramic materials.
2. Define bond length.
3. Explain the photo elastic method of NDT.
4. Write any two difference between gamma ray and X-ray radiographic techniques.
5. Give few applications of ferrofluids.
6. What are SMART materials?
7. What is meant by true stress and true strain? Give the power relation connecting them.
8. Differentiate between hard and soft magnetic materials.
9. What is dielectric breakdown?
10. Define Poisson's ratio.

PART - B

ANSWER ANY FOUR QUESTIONS

(4×7.5 = 30)

11. Explain the different kinds of stability employing a tilting rectangular block.
12. Discuss the classification of magnetic materials.
13. Explain the method to detect flaws using ultrasonic method with a neat diagram.
14. Briefly explain the role of elastic modulus as an important parameter in design.
15. Give the essential features of MEMS and NEMS and discuss the materials employed in fabrication.
16. Explain in detail the various levels of structure of materials.

PART - C

ANSWER ANY FOUR QUESTIONS

(4×12.5= 50)

17. Discuss the formation of ionic bond in sodium chloride crystal and hence obtain the expression for the potential energy of the system.
18. Explain the different types of polarization and derive the total expression for the total polarization of a material.
19. (a) Explain the fundamentals of dielectric elastomers and give its application.
(b) Give the medical applications of shape memory alloys (SMA). (6+6.5)
20. Describe the working of a metallurgical microscope with a neat diagram.
21. With the help of interatomic force vs distance curve, explain the atomic model of elastic behavior.
22. Discuss the essential properties of ferroelectric materials and explain the structure of Barium titanate (BaTiO_3).

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