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N – 6245

Reg. No. :

Name :

Fourth Semester M.Sc. Degree Examination, June 2022

Physics

Special Paper II

PH 243 M — MATERIALS SCIENCE - II

(2018-2019 Admission)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **any five** questions. Each question carries **3** marks.

- I. (a) Explain the difference between bound charges and free charges.
- (b) What is Meissner effect? Explain.
- (c) What is meant by photoluminescence?
- (d) Write a short note on Seebeck effect.
- (e) What is meant by quantum confinement?
- (f) Describe two methods for fabrication of carbon nanotubes.
- (g) Write a short note on sputtering.
- (h) What is spintronics?

(5 × 3 = 15 Marks)

P.T.O.

SECTION – B

Answer **all** questions. Each question carries **15** marks.

- II. (A) (a) Give the analysis of band theory of solids and hence make a distinction between conduction and insulation.
- (b) Briefly explain about electromagnetic spectrum-reflection, refraction and absorption.

OR

- (B) With the help of energy level diagram, briefly describe about excitation, absorption and emission process of luminescence.

- III. (A) Explain piezoelectricity, pyroelectricity and ferroelectricity with examples and applications.

OR

- (B) (a) Describe bucky balls, their properties and its uses.
- (b) Describe any two properties of carbon nanotubes.

- IV. (A) Explain the synthesis of nanomaterials.
- (a) Hydrothermal method
- (b) CVD
- (c) Combustion method.

OR

- (B) Explain the following
- (a) MEMS
- (b) Magneto resistance
- (c) Spin relaxation mechanisms

(3 × 15 = 45 Marks)

SECTION – C

Answer any **three** of the following questions. Each question carries **5** marks.

- V. (a) What is meant by dielectric loss? Derive expression for it.
- (b) What are the different kinds of color centers in alkali?
- (c) What is meant by thermoelectric figure of merit?
- (d) Explain the structure of fullerene.
- (e) How to find inter planar distance of a crystal using Bragg's law.
- (f) Explain-Quantum mechanics of spin

(3 × 5 = 15 Marks)
