# PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

## BSc DEGREE EXAMINATION MAY 2025
(Sixth Semester)

Branch – **PHYSICS**

## MATERIALS SCIENCE

Time: Three Hours | Maximum: 50 Marks

### SECTION-A (5 Marks)
Answer **ALL** questions
**ALL** questions carry **EQUAL** marks (5 x 1 = 5)

1 Find the space lattice, for a unit cell has a = b = c = 5A° and α=γ = β ≠90°
(i) Tetragonal (ii) Trigonal
(iii) Triclinic (iv) orthorhombic

2 Choose the correct one: A superconductors is a perfect diamagnetic materials. Since it is
(i) Attract the magnetic field towards its center
(ii) Attract the magnetic field but transfer it into concentrated zone
(iii) Repel all the magnetic lines of force passing through it
(iv) Not influence the magnetic field

3 The magnetic induction retained by the specimen when the magnetizing field is reduced from saturation value to zero.
(i) Retentivity (ii) Coercivity
(iii) Permeability (iv) susceptibility

4 Which of the following Technique is used to measure particle size and its distribution of nanomaterial?
(i) X-ray diffraction (ii) Dynamic light scattering
(iii) Raman spectroscopy (iv) Energy dispersive X- ray analysis

5 What is the source used in Radiographic NDT method?
(i) Electron rays (ii) Bright white light
(iii) Ultrasonic rays (iv) Gamma rays

### SECTION - B (15 Marks)
Answer **ALL** Questions
**ALL** Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a How the Miller indices are determined? Mention their significance.
OR
b Distinguish between edge and screw dislocation.

7 a Analyze the frequency dependence of polarization.
OR
b Differentiate Type I and Type II superconductors.

8 a Describe the structure of Ferrites.
OR
b Sketch the structure of long chain polymers.

9 a Mention the significance of nanoparticles and its impact.
OR
b Classify the nano materials with examples.

10 a Compare photo elastic method and electrical method.
OR
b How the surface defect is detected by NDT.

**Cont...**

## SECTION -C (30 Marks)

Answer **ALL** questions

**ALL** questions carry **EQUAL** Marks (5 x 6 = 30)

11 a Explain different types of point imperfection with neat sketch.

OR

b Examine the various surface imperfections.

12 a Discuss the classical free electron theory of a solid.

OR

b By doping impurities, the energy gap and conductivity of a extrinsic semiconductor is varied – Justify.

13 a Discuss the classification of polymers.

OR

b Analyze the domain theory of ferromagnetism.

14 a Discuss any two solid phase techniques used for the synthesis nano materials.

OR

b How does the Transmission Electron Microscope help in studying the morphological analysis of nano materials?

15 a Examine the Ultrasonic methods of nondestructive testing. Mention its merits and demerits.

OR

b Outline the construction and working of Piezo electric generator.

Z-Z-Z END