

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch – SOFTWARE SYSTEMS (Five year Integrated)

APPLIED PHYSICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10 x 1 = 10)

- 1 Spontaneous emission refers to
 - (i) Emission due to external stimulation
 - (ii) Emission without external stimulation
 - (iii) Absorption of light
 - (iv) Emission at higher frequencies
- 2 The principle of a YAG laser is based on
 - (i) Ruby crystal
 - (ii) Fiber optics
 - (iii) Neodymium-doped Yttrium Aluminum Garnet
 - (iv) CO₂ gas
- 3 Band theory of solids helps in understanding
 - (i) Magnetic properties of metals
 - (ii) Conductivity of solids
 - (iii) Nuclear structure
 - (iv) Light emission from materials
- 4 Resistivity is defined as
 - (i) The opposition to the flow of electric current
 - (ii) The ability of a material to conduct heat
 - (iii) The voltage across a conductor
 - (iv) The energy lost in a material
- 5 An extrinsic semiconductor is
 - (i) Pure with no impurities
 - (ii) Impure with added dopants
 - (iii) Always a metal
 - (iv) A material with high conductivity
- 6 The Hall effect is used to
 - (i) Measure voltage
 - (ii) Determine the magnetic field strength
 - (iii) Calculate temperature
 - (iv) Determine the type of charge carriers
- 7 Ferromagnetic materials are characterized by
 - (i) Weak interaction with magnetic fields
 - (ii) Strong magnetic ordering
 - (iii) No magnetic properties
 - (iv) No magnetic properties
- 8 Hysteresis refers to
 - (i) Energy loss due to lag in magnetization
 - (ii) Magnetic flux variation
 - (iii) Electrical conductivity increase
 - (iv) Thermal expansion of metals
- 9 Shape memory alloys (SMA) are known for
 - (i) Superconductivity
 - (ii) Returning to their original shape after deformation
 - (iii) Absorbing heat energy
 - (iv) Being brittle under stress
- 10 Superconductivity is a property where materials
 - (i) Conduct heat efficiently
 - (ii) Absorb magnetic fields
 - (iii) Show zero electrical resistance
 - (iv) Emit light when cooled

Cont...

SECTION - B (35 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(5 x 7 = 35)

- 11 a Explain the classification of lasers based on materials and explain their application.
OR
b Discuss the different modes of propagation in fiber optics.
- 12 a Explain the factors affecting the resistivity of metals.
OR
b Discuss the applications of conducting materials and resistance thermometers.
- 13 a Explain the working of a solar cell and its applications.
OR
b Discuss the different types of semiconductor memory devices.
- 14 a Explain the domain theory of ferromagnetism.
OR
b Discuss the properties and applications of hard and soft magnetic materials.
- 15 a Explain the properties and applications of shape memory alloys.
OR
b Discuss the synthesis methods and applications of nano materials.

SECTION - C (30 Marks)

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks

(3 x 10 = 30)

- 16 Describe the working mechanism and applications of a CO₂ laser in detail.
- 17 Describe the Drude-Lorentz theory of electrical conduction and its applications.
- 18 Describe the intrinsic and extrinsic semiconductors, highlighting their properties and applications.
- 19 Describe the structure and applications of optical, magnetic, and magneto-optical memory devices.
- 20 Describe the types and applications of superconductors, including SQUID, levitation, and cryotron.

Z-Z-Z

END