

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BSc DEGREE EXAMINATION MAY 2025
(Second Semester)**

Branch – MATHEMATICS & MATHEMATICS WITH COMPUTER APPLICATIONS

PHYSICS- II

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

| Module No. | Question No. | Question | K Level | CO |
|------------|--------------|--|---------|-----|
| 1 | 1 | How does the period of a simple pendulum change with an increase in its length? a) It increases b) It decreases c) It remains constant d) It depends on the mass of the bob | K1 | CO1 |
| | 2 | What is the relationship between the period (T) and the length (L) of a simple pendulum? a) $T \propto L$ b) $T \propto L^2$ c) $T \propto \sqrt{L}$ d) $T \propto 1/L$ | K2 | CO1 |
| 2 | 3 | What is the relationship between the wavelength (λ) and frequency (f) of an electromagnetic wave? a) $\lambda = f$ b) $\lambda = f/2$ c) $\lambda = 2f$ d) $\lambda \propto f$ | K1 | CO2 |
| | 4 | Which of the following electromagnetic waves has the longest wavelength? a) Visible light b) Infrared radiation c) Microwaves d) Radio waves | K2 | CO2 |
| 3 | 5 | What property of an optical fiber determines its ability to carry light signals over long distances without significant loss? a) Numerical aperture b) Refractive index c) Core diameter d) Attenuation coefficient | K1 | CO3 |
| | 6 | Which type of optical fiber is commonly used in telecommunications due to its ability to carry multiple wavelengths simultaneously? a) Single-mode fiber b) Multi-mode fiber c) Step-index fiber d) Graded-index fiber | K2 | CO3 |
| 4 | 7 | What is the primary application of the Peltier effect? a) Heating elements b) Cooling devices c) Power generation d) Magnetic field generation | K1 | CO4 |
| | 8 | Which material property plays a significant role in the efficiency of Peltier cooling devices? a) Electrical conductivity b) Thermal conductivity c) Dielectric constant d) Magnetic susceptibility | K2 | CO4 |
| 5 | 9 | Which of the following is true for the current-voltage (I-V) characteristic curve of a junction diode? a) Linear relationship b) Exponential relationship c) Quadratic relationship d) Inverse relationship | K1 | CO5 |
| | 10 | What happens if the reverse bias voltage across a Zener diode exceeds its breakdown voltage? a) Diode conducts heavily b) Diode becomes an open circuit c) Diode conducts lightly d) Diode becomes a short circuit | K2 | CO5 |

Cont...

SECTION - B (35 Marks)Answer ALL questions
ALL questions carry EQUAL Marks

(5 × 7 = 35)

| Module No. | Question No. | Question | K Level | CO |
|------------|--------------|--|---------|-----|
| 1 | 11.a. | Derive equation of simple harmonic motion. | K2 | CO1 |
| | (OR) | | | |
| | 11.b. | Derive an expression for period of oscillations of a simple pendulum. | | |
| 2 | 12.a. | Obtain the relation between E and H in a uniform plane wave. | K2 | CO2 |
| | (OR) | | | |
| | 12.b. | Obtain the relation between μ and ϵ_r . | | |
| 3 | 13.a. | Explain the losses in optical fibres. | K4 | CO3 |
| | (OR) | | | |
| | 13.b. | Discuss the propagation of light through an optical fibre. | | |
| 4 | 14.a. | Discuss an experiment to find the voltage and current sensitives using thermocopule. | K3 | CO4 |
| | (OR) | | | |
| | 14.b. | Explain the e.m.f in a thermocouple. | | |
| 5 | 15.a. | Describe an experiment to obtain the I-V characteristics of a Junction diode. | K5 | CO5 |
| | (OR) | | | |
| | 15.b. | Explain the construction and working of a Light emitting diode. | | |

SECTION -C (30 Marks)Answer ANY THREE questions
ALL questions carry EQUAL Marks

(3 × 10 = 30)

| Module No. | Question No. | Question | K Level | CO |
|------------|--------------|--|---------|-----|
| 1 | 16 | Derive an expression for the period of oscillation of a torsional pendulum. | K2 | CO1 |
| 2 | 17 | Derive maxwell's wave equations for free space. | K2 | CO2 |
| 3 | 18 | Explain the application of fibre optics. | K3 | CO3 |
| 4 | 19 | Explain the Variation of thermoelectric emf with temperature. | K3 | CO4 |
| 5 | 20 | Explain the following (i) Varactor diode (ii) Light source for Fiber optic system. | K4 | CO5 |

Z-Z-Z

END