24MCU207A/22MCU207AN

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(Second Semester)

Branch - **MATHEMATICS WITH COMPUTER APPLICATION**

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	The phase difference between the velocity and displacement of a particle executing SHM is: a) $\pi/2$ radian b) π radian c) 2π radian d) zero	K2	CO1
	2	The work done by a simple pendulum in one complete oscillation is: a) equal to kinetic energy b) zero c) equal to total energy d) equal to potential energy	K1	CO1
2	3	For propagation of EM waves in free space, E K and H vectors are mutually: a) co-planar b) co-linear c) orthogonal d) normal to the surface	K1	CO2
	4	In Maxwell's equation, curl $H = J + \partial D/\partial t$ is known as: a) Gauss's law b) Ampere's law c) Faraday's law d) Newton's law	K2	CO2
3	5	In optical fibers, the refractive index of cladding is: a) more than that of core b) less than that of core c) equal to that of core d) both (a) and (c)	K1	CO3
	6	In fibre optics, an optical fibre whose core refractive index decreases with increasing radial distance from the fibre axis is known as: a) graded-index fibre b) step-index fibre c) both (a) & (b) d) none of these	K2	CO3
4	7	The current produced in a thermocouple is: a) drift current b) diffusion current c) displacement current d) none of these	K1	CO4
	8	In Peltier effect, the heat produced is: a) directly proportional to I b) indirectly proportional to I c) inversely proportional to I½ d) directly proportional to I^2	K2	CO4
5	9	The leakage current across a diode due to p–n junction is caused by: a) minority carriers b) majority carriers c) junction capacitance d) none of these	K1	CO5
	10	The device associated with voltage-controlled capacitance is: a) LED b) photo-diode c) varactor diode d) Zener diode	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 an expression for the period of motion for a simple pendulum and a torsional pendulum.	K4	CO1
		(OR)		
	11.b.	Differentiate between forced, damped, and free oscillations.		
2	12.a.	Explain the concepts of electromagnetic waves and define electromagnetic equations.	K5	CO2
		(OR)		
	12.b.	State and explain: (i) Uniform plane waves (ii) Characteristic impedance		
3	13.a.	Explain the working principle of optical fibres. Derive an expression for the numerical aperture.	K5	CO3
		(OR)		
	13.b.	Explain the losses in optical fibres, and give some applications.		
4	14.a.	What is the Seebeck effect? Give the relation between temperature and thermo-emf with a neat graph.	K4	CO4
		(OR)		
	14.b.	Write in detail the applications of thermocouples and the figure of merit.		
5	15.a.	Discuss about the V–I characteristics of Zener diode.	K6	CO5
		(OR)		
	15.b.	Discuss in detail about: (i) Solar cells (ii) Photodetectors		

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	Explain the relation in phase difference between displacement, velocity, and acceleration in SHM, both graphically and theoretically.	K5	CO1
2	17	Derive Maxwell's equations. Discuss the physical significance of each equation.	K6	CO2
3	18	How can we classify optical fibres? Distinguish the construction of single-mode fibre and multimode fibre.	K4	CO3
4	19	Explain the Peltier effect and Peltier coefficient. Distinguish between Peltier and Thomson effects.	K4	CO4
5	20	Explain the current components in a p–n junction diode and derive the diode equation.	K5	CO5

Z-Z-Z END