Reg. No.																

Question Paper Code	14177

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

First Semester

Computer Science and Business Systems

20BSPH102 - FUNDAMENTALS OF PHYSICS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	The --------- principle is used in Interference. (a) Heisenberg's Uncertainty (b) Superposition (c) Quantum (d) Fermi	1	K1	CO1
2.	The incident wavefronts in Fresnel and Fraunhofer diffraction are --- and --- respectively. (a) Planar and Planar (b) Planar and cylindrical (c) Cylindrical and Planar (d) Cylindrical and Cylindrical	1	K1	CO1
3.	Repeatable entity of a crystal structure is known as ------- (a) unit cell (b) Miller indices (c) Bravais (d) amorphous	1	K1	CO2
4.	Allotropes differ in which of the following: (a) atomic number (b) crystal structure (c) mass number (d) volume	1	K1	CO2
5.	Damping force on a spring mass system is proportional to ----- (a) velocity (b) acceleration (c) displacement from mean position (d) $(velocity)^2$	1	K1	CO3
6.	Electromagnetic waves are produced by ------ charges. (a) stationary (b) accelerated (c) neutral (d) positive	1	K1	CO3
7.	The enthalpy and internal energy are the function of temperature for ----- (a) all gases (b) steam (c) water (d) ideal gas	1	K1	CO4
8.	Fermions are --- (a) electrons (b) protons (c) neutrons (d) positron	1	K1	CO4
9.	Rayleigh Jean's law holds good for -------- (a) shorter wavelength (b) longer Wavelength (c) X Ray region (d) all types of wavelengths	1	K1	CO5
10.	Numerical aperture is ---- (a) sine of the acceptance angle (b) cos of the critical angle (c) cos of the acceptance angle (d) sine of the critical angle	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	Compare interference and diffraction.	2	K2	CO1
12.	State Brewster's law.	2	K1	CO1
13.	Define primitive and non-primitive cell.	2	K1	CO2
14.	What is damping?	2	K1	CO2
15.	Write down Maxwell's first and second equation.	2	K1	CO3
16.	State zeroth law of thermodynamics.	2	K1	CO3
17.	State Heisenberg's uncertainty principle.	2	K1	CO4
18.	What are matter waves?	2	K1	CO4
19.	What is stimulated emission?	2	K1	CO5
20.	Illustrate the schematic diagram of CO_2 laser.	2	K2	CO5
21.	List out some applications of lasers in medical field.	2	K1	CO6
22.	How does pressure sensor works? Explain.	2	K2	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Explain the phenomenon of interference in young's double slit experiment and derive the expression for its fringe width.	*11*	*K2*	*CO1*
		OR			
	b)	Describe the theory of plane transmission grating and derive equation of maxima and minima.	*11*	*K2*	*CO1*
24.	a)	Prove that the atomic packing factor of HCP is 0.74.	*11*	*K2*	*CO2*
		OR			
	b)	Derive the differential equation of a damped harmonic oscillator.	*11*	*K2*	*CO2*
25.	a)	Derive the expression for Maxwell's equations in differential form.	*11*	*K2*	*CO3*
		OR			
	b)	Explain the concept of heat engine operating between two different heat reservoirs and derive expression for its efficiency.	*11*	*K2*	*CO3*
26.	a)	Derive an expression for Planck's law of radiation.	*11*	*K2*	*CO4*
		OR			
	b)	Deduce the relation for time independent Schrodinger's wave equation.	*11*	*K2*	*CO4*
27.	a)	For atomic transitions, derive Einstein's relations and hence deduce the expression for ratio of spontaneous emission rate to the stimulated emission rate.	*11*	*K2*	*CO5*
		OR			
	b)	Describe the classification of optical fibers based on refractive index profile and propagation modes.	*11*	*K2*	*CO5*
28.	a)	Explain the various applications of lasers in engineering field.	*11*	*K2*	*CO6*
		OR			
	b)	Outline the applications of fiber optics.	*11*	*K2*	*CO6*