Reg. No.																

Question Paper Code	13121

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

First Semester

Computer Science and Business Systems

20BSPH102 - FUNDAMENTALS OF PHYSICS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	The main principle used in Interference is _____ (a) Heisenberg's Uncertainty Principle (b) Superposition Principle (c) Quantum Mechanics (d) Fermi Principle	1	K1	CO1
2.	Which of the following factors does the intensity of light depend on? (a) Frequency (b) Wavelength (c) Amplitude (d) Velocity	1	K1	CO1
3.	X-ray crystallography uses which characteristic of light? (a) Polarization (b) Interference (c) Diffraction (d) Coherency	1	K2	CO1
4.	Repeatable entity of a crystal structure is known as (a) unit cell (b) Miller indices (c) Bravais (d) amorphous	1	K1	CO2
5.	Atomic packing factor for BCC is (a) 0.52 (b) 0.74 (c) 0.68 (d) 0.34	1	K1	CO2
6.	Allotropes differ in which of the following (a) atomic number (b) crystal structure (c) mass number (d) number of moles	1	K2	CO2
7.	Damping force on a spring mass system is proportional to which of the following quantities? (a) Velocity (b) Acceleration (c) Displacement from mean position (d) $(velocity)^2$	1	K2	CO3
8.	If the metal bob of a simple pendulum is replaced by a wooden bob, then its time period will --- (a) increase (b) decrease (c) remain the same (d) increase and then decrease	1	K2	CO3
9.	What is the frequency with which the forced periodic oscillations oscillate? (a) Frequency of forced oscillator (b) Their natural frequency (c) No specific frequency (d) Sum of frequency of forced oscillator & their natural frequency	1	K1	CO3
10.	Electromagnetic charges are produced by (a) stationary charge (b) accelerated charge (c) charge in motion (d) charged particles	1	K1	CO4
11.	Which of the following law do not form a Maxwell equation (a) Planck's law (b) Gauss's law (c) Faraday's law (d) Ampere's law	1	K1	CO4
12.	The enthalpy and internal energy are the function of temperature for (a) all gases (b) steam (c) water (d) ideal gas	1	K1	CO4
13.	If the materials which have resistivity more than 3 eV, then they are called as (a) semiconductors (b) insulators (c) conductors (d) copper	1	K1	CO5
14.	Fermions are --- (a) electrons (b) protons (c) neutrons (d) positron	1	K1	CO5
15.	Ideally, black body can emit and absorb (a) Red (b) blue (c) yellow (d) all wavelengths	1	K1	CO5
16.	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
17.	The principle of LASER is (a) spontaneous emission (b) stimulated emission (c) reflection (d) transmission	1	K1	CO6

18.	The transition of atoms from higher to lower state is not triggered in ------- emission. (a) stimulated (b) spontaneous (c) forced (d) triggered	*1*	*K2*	*CO6*
19.	Which of the following pumping methods is used in Nd:YAG laser? (a) Direct conversion (b) Optical pumping (c) Chemical (d) Electric discharge	*1*	*K1*	*CO6*
20.	_____ is the light carrying member of an optical fiber. (a) Cladding (b) Core (c) Buffer (d) Outer jacket	*1*	*K2*	*CO6*

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21.	Summarize the fundamental conditions for obtaining sustained interference pattern.	*2*	*K2*	*CO1*
22.	Define the term polarization.	*2*	*K1*	*CO1*
23.	How crystalline materials differ from non-crystalline?	*2*	*K1*	*CO2*
24.	Compare primitive and non-primitive cell.	*2*	*K2*	*CO2*
25.	Explain the criterion for the motion to be simple harmonic.	*2*	*K2*	*CO3*
26.	What is damping?	*2*	*K1*	*CO3*
27.	State zeroth law of thermodynamics.	*2*	*K1*	*CO4*
28.	Outline the use of PV diagram in thermodynamics.	*2*	*K2*	*CO4*
29.	Mention some physical significance of wave function.	*2*	*K1*	*CO5*
30.	What is the principle of light propagation in an optical fiber?	*2*	*K1*	*CO6*

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31.	a)	Explain the phenomenon of interference in Young's double slit experiment and derive the expression for its fringe width.	*10*	*K2*	*CO1*
		OR			
	b)	With neat sketch explain the formation of Newton rings and derive the expression for the diameter of dark.	*10*	*K2*	*CO1*
32.	a)	With a neat sketch, calculate the atomic packing factor for BCC and FCC crystal structures.	*10*	*K2*	*CO2*
		OR			
	b)	Derive the expression for the interplanar spacing in a cubic structure.	*10*	*K2*	*CO2*
33.	a)	Explain the concept of damped harmonic oscillation in LCR circuit and derive its differential equation.	*10*	*K2*	*CO3*
		OR			
	b)	With neat sketch derive the expression for time period of oscillation andfrequency of a spring -mass system suspended horizontally.	*10*	*K2*	*CO3*
34.	a)	Derive Maxwell's equations in integral form.	*10*	*K2*	*CO4*
		OR			
	b)	Explain the concept of heat engine operating between two different heat reservoirs and derive expression for its efficiency.	*10*	*K2*	*CO4*
35.	a)	Deduce the expression for De-Broglie wavelength and represent it in the form of energy and accelerating potential.	*10*	*K2*	*CO5*
		OR			
	b)	Derive the expression for time independent Schrodinger wave equation for a free particle in three-dimensional space.	*10*	*K2*	*CO5*
36.	a)	For atomic transitions, derive Einstein's coefficients A and B.	*10*	*K2*	*CO6*
		OR			
	b)	Describe the classification of optical fibers based on mode and refractive index profile.	*10*	*K2*	*CO6*