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Question Paper Code	12926
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B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

First Semester

Computer Science and Business Systems
20BSPH102 - FUNDAMENTALS OF PHYSICS
 Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. Define unit cell.	2	K1	CO2
2. The lattice constant for a unit cell of aluminum is 4.049 Å. Calculate the spacing of (220) plane.	2	K2	CO2
3. Is it necessary that all simple harmonic motion be periodic in nature and vice versa?	2	K2	CO3
4. Define Q-factor (or) Quality factor.	2	K1	CO3
5. State continuity equation.	2	K1	CO4
6. State Zeroth law of thermodynamics.	2	K1	CO4
7. How will you distinguish between metals, semiconductors and insulators based on band theory?	2	K2	CO5
8. Mention some physical significance of wave function.	2	K2	CO5
9. Distinguish between spontaneous and stimulated emission.	2	K1	CO6
10. What is the principle of an optical fiber?	2	K1	CO6

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Explain the procedure to obtain the miller indices of crystal planes with suitable example. And also derive an expression for inter planar d-spacing in a cubic structure.	13	K2	CO2
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OR

b) What is packing factor? Obtain packing factors for SC, BCC, and FCC lattices.	13	K2	CO2
12. a) Derive the expression for energy decay quality for a damped harmonic oscillator and give the reason for energy dissipation.	13	K2	CO3

OR

b) With neat sketch derive the expression for time period of oscillation and frequency of a spring -mass system suspended both horizontally vertically.	13	K2	CO3
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13. a) Derive Maxwell's electromagnetic wave equation for a non-conducting medium and in vacuum. 13 K2 CO4

OR

- b) Define Entropy. What is its physical significance? Show that the entropy remains constant in a reversible process. What happens if the process is an irreversible one? 13 K2 CO4

14. a) Deduce an expression for black body radiation using Planck's quantum theory in terms of frequency. 13 K2 CO5

OR

- b) Derive Schrodinger's time independent and time dependent wave equation for matter waves. 13 K2 CO5

15. a) Describe the principle, construction and working of a CO₂ laser with a neat sketch. 13 K2 CO6

OR

- b) Classify the types of fiber based on materials, mode and refractive index. 13 K2 CO6

PART - C (1 × 15 = 15 Marks)

16. a) Explain the phenomenon of interference in young's double slit experiment and derive the expression for its fringe width. 15 K2 CO1

OR

- b) Explain the theory of plane transmission grating and derive equation of maxima and minima. 15 K2 CO1