

Reg. No.

Question Paper Code

11753

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022 (MARCH 2023)

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,
K-Level, CO</i> |
|-------------------------------------------------------------------------------------------------------|-------------------------------|
| 1. What are lattice parameters of a 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. Define damping. | 2,K1,CO3 |
| 4. Define Q-factor (or) Quality factor. | 2,K1,CO3 |
| 5. State zeroth law of thermodynamics. | 2,K1,CO4 |
| 6. Outline the use of PV diagram in thermodynamics. | 2,K1,CO4 |
| 7. State Plank's law of radiation. | 2,K1,CO5 |
| 8. Why energy levels are quantized for a particle in one dimensional box | 2,K2,CO5 |
| 9. Define the term population inversion. | 2,K1,CO6 |
| 10. Differentiate between step index and graded index fiber. | 2,K2,CO6 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) With neat sketch calculate the atomic packing fraction for BCC and FCC crystal structures. 13,K2,CO2
- OR**
- b) Explain the procedure to obtain the miller indices of crystal planes with suitable example. 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 and vertically. 13,K2,CO3

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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13. a) State and derive Maxwell's equation in point form and represent it for a non-conducting medium. *13,K2,CO4*

OR

- b) Summarize the concept of reversible and irreversible process? Illustrate your answer with some examples. *13,K2,CO4*

14. a) Derive the expression for time independent and dependent Schrodinger wave equation for a free particle in three-dimensional space. *13,K2,CO5*

OR

- b) Deduce the expression for De-Broglie wavelength and represent it in the form of energy and accelerating potential. *13,K2,CO5*

15. a) Explain the working of solid-state Ruby laser with the help of neat energy level diagram. *13,K2,CO6*

OR

- b) Describe the construction and working of a CO₂ laser with a neat sketch. *13,K2,CO6*

PART - C (1 × 15 = 15 Marks)

16. a) With neat sketch explain the formation of Newton rings and derive the expression for the diameter of dark and bright rings in a reflected system. *15,K3,CO1*

OR

- b) Discuss the Fraunhofer diffraction at single slit. Obtain condition for principal maximum and minimum. *15,K3,CO1*