Printed Page:- 03 **Subject Code:- BCSBS0101**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: I - THEORY EXAMINATION (2024- 2025)

Subject: Physics for Computing Science

Time: 2 Hours **Max. Marks: 50**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 15

1. Attempt all parts:-

1-a. A particle in simple harmonic motion while passing through mean position will have (CO1, K1) 1

(a) maximum kinetic energy and maximum potential energy

(b) maximum kinetic energy and minimum potential energy

(c) minimum kinetic energy and maximum potential energy

(d) minimum kinetic energy and minimum potential energy

1-b. The ray which obeys Snell's law of refraction is known as (CO2, K1) 1

(a) ordinary ray

(b) extraordinary ray

(c) simple ray

(d) electric ray

1-c. Equation of Continuity shows conservation of.. (CO3, K1) 1

(a) force

(b) energy

(c) charge

(d) momentum

1-d. When the system is in equilibrium with the surroundings, it must be in (CO4, K1) 1

(a) pressure equilibrium

(b) temperature equilibrium

(c) chemical equilibrium

(d) All of the Above

1-e. Which of the following is the property of lasers? (CO5, K1) 1

(a) Highly directional

(b) Monochromatic

(c) Coherent

(d) All the above

2. Attempt all parts:-

2.a. Define resonance in forced harmonic oscillations? (CO1, K1) 2

2.b. What is double refraction? Explain. (CO2, K1) 2

2.c. What is displacement current? (CO3, K1) 2

2.d. What do you mean by entropy? (CO4, K1) 2

2.e. What is pumping? (CO5, K1) 2

SECTION-B 15

3. Answer any three of the following:-

3-a. A 9 kg mass attached to a spring is observed to oscillate with a period of 3 seconds. What is the period of oscillation if a 15 kg mass is attached to the spring? (CO1, K3) 5

3-b. Light of wavelength 500 nm forms an interference pattern on a screen at a distance of 2 m from the slit. If the distance between the consecutive bright or dark fringes is 0.05 cm, find the distance between the slits. (CO2, K3) 5

3.c. The relative permittivity of distilled water is 81. Calculate refractive index and velocity of light in it. (CO3, K3) 5

3.d. What is the maximum possible cycle efficiency of a heat engine operating between a heat source at 600 °C and a heat sink at 60 °C? (CO4, K3) 5

3.e. In a CO_2 laser, the energy difference between two levels is 0.100 eV. Calculate the frequency of radiation (CO5, K3) 5

SECTION-C 20

4. Answer any one of the following:-

4-a. What is damped simple harmonic motion? Derive differential equation for it. (CO1, K2) 4

4-b. Define simple harmonic motion (SHM). Also explain the terms time period, amplitude and phase of a wave. (CO1, K1) 4

5. Answer any one of the following:-

5-a. Give the construction and theory of plane transmission grating and explain the formation of spectra by it. (CO2, K2) 4

5-b. Derive an expression for n^{th} dark Newton's ring in reflected light. (CO2, K2) 4

6. Answer any one of the following:-

6-a.	Derive Maxwell's 3rd equation. (CO3, K2)	4
6-b.	What is the band theory of solids? (CO3, K1)	4
7. Answer any one of the following:-		
7-a.	Explain zeroth law and second law of thermodynamics. (CO4, K1)	4
7-b.	Derive an expression for the efficiency of Carnot heat engine. (CO4, K2)	4
8. Answer any one of the following:-		
8-a.	Discuss the construction and working of neodymium laser. (CO5, K2)	4
8-b.	Discuss Step-index multimode and Graded Index (GRIN) multimode fiber. (CO5, K2)	4