Printed Page:- **Subject Code:- ACSBS0101**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: I - THEORY EXAMINATION (2022 - 2023)

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. Energy of SHM always..... (CO1) 1

(a) 0

(b) Decreases

(c) remain conserved

(d) increases

1-b. Center of Newton's ring in reflected region is dark because at center path difference is (CO2) 1

(a) λ/2

(b) 2λ/2

(c) 3λ/2

(d) none

1-c. Freely moving particle inside the 1-d box has (CO3) 1

(a) only kinetic energy

(b) potential energy

(c) both energy

(d) none

1-d. How many Bravais lattices are present in the crystal systems? (CO4) 1

(a) 12

(b) 13

(c) 14

(d) 10

1-e. What conservation does first law of thermodynamics represent? (CO5) 1

(a) energy

(b) mass

(c) temperature

(d) none

2. Attempt all parts:-

2.a. How does energy decay in damped harmonic oscillator? (CO1) 2

2.b. Two independent sources could not produce interference, why? (CO2) 2

2.c. State two properties of matter waves. (CO3) 2

2.d. Draw Plane (1,1,1) in cubic crystal. (CO4) 2

2.e. What are the advantages of optical fibre over copper wire? (CO5) 2

SECTION B **15**

3. Answer any <u>three</u> of the following:-

3-a. A particle executes simple harmonic motion with amplitude of 5 cm. When the particle is at 4 cm from the mean position, the magnitude of its velocity in SI units is equal to that of its acceleration. Then, calculate its periodic time in second. (CO1) 5

3-b. Newton's rings are observed in the reflected light of wavelength 5900 Å. The diameter of 10^{th} dark ring is 0.5 cm. Find the radius of curvature of the lens used. (CO2) 5

3.c. Calculate the energy difference between the ground state and first excited state for electron in one dimensional rigid box of length 10^{-10}m (CO3) 5

3.d. Iron has BCC structure with atomic radius 0.123 Angstroms. Find the volume of unit cell. (CO4) 5

3.e. Compute the numerical aperture and the acceptance angle of an optical fibre from the following data: n_1(core)=1.48 and n_2 (cladding) =1.46 (CO5) 5

SECTION C **20**

4. Answer any <u>one</u> of the following:-

4-a. Find the expressions for velocity and acceleration in simple harmonic motion. (CO1) 4

4-b. Illustrate Maxwell's four equations in vacuum and non-conducting medium. (CO1) 4

5. Answer any <u>one</u> of the following:-

5-a. Describe Fresnel's biprism with neat diagram and explain how wavelength of monochromatic light is determined by it? (CO2) 4

5-b. Discus the phenomenon of Fraunhofer diffraction at single slit and show that the relative intensities of successive maxima are nearly – 1: $4/9\pi^2$: $4/25\pi^2$: $4/49\pi^2$ ..... (CO2) 4

6. Answer any <u>one</u> of the following:-

6-a. What is Heisenberg's uncertainty principle? Apply it to find the radius of first orbit. (CO3) 4

6-b. Illustrate the time dependent Schrodinger wave equation. (CO3) 4

7. Answer any <u>one</u> of the following:-

7-a. Define packing factor. Calculate packing factor in case of Simple cubic structure(SC). (CO4) 4

7-b. Define conductors, semiconductors and insulators. Differentiate between them on the basis of band width. Cite examples as well. (CO4) 4

8. Answer any <u>one</u> of the following:-

8 Discuss the construction and working of a CO_2 laser. (CO5) 4

8 What do you mean by heat engine? Also illustrate some application of thermodynamics. (CO5) 4