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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. The acceleration of particle executing S.H.M. when it is at mean position is (CO1, K1) 1
- (a) infinite
- (b) varies
- (c) maximum
- (d) zero
- 1-b. Formation of Newton's rings are due to (CO2, K1) 1
- (a) interference by division of amplitude
- (b) interference by division of wave front
- (c) diffraction of light
- (d) none
- 1-c. Which law is Maxwell's IIIrd equation? (CO3, K1) 1
- (a) Gauss' law
- (b) Lenz's law
- (c) Faraday's law
- (d) Ampere's Law
- 1-d. Zeroth law of thermodynamics based on which parameter (CO4, K1) 1
- (a) Temperature
- (b) Pressure

- (c) Density
(d) Velocity
- 1-e. In the formation of optical fiber core has refractive index than that of cladding. (CO5, K1) 1
- (a) larger
(b) equal
(c) smaller
(d) none

2. Attempt all parts:-

- 2.a. What do you understand by simple harmonic motion (SHM)? (CO1, K1) 2
- 2.b. What are main differences between interference and diffraction? (CO2, K1) 2
- 2.c. What are intrinsic semiconductors? (CO3, K1) 2
- 2.d. What do you mean by Carnot's Principle? (CO4, K1) 2
- 2.e. What is difference between spontaneous and stimulated emission? (CO5, K1) 2

SECTION-B

15

3. Answer any three of the following:-

- 3-a. A 4 kg mass is hung on the end of a helical string and is pulled down and let go so as to vibrate vertically. The mass completes 100 vibrations in 55 second. Calculate the force constant to the spring. (CO1, K3) 5
- 3-b. Newton's rings are observed normally in reflected light of wavelength 5900 \AA . The diameter of the 10th dark ring is 0.005 m. Find the radius of curvature of the lens and thickness of the air film. (CO2, K3) 5
- 3.c. If the relative permeability and relative permittivity of the medium are 1.0 and 2.25, respectively. Find the speed of the electromagnetic wave in this medium. (CO3, K3) 5
- 3.d. In a cyclic process, heat transfers are +14.7kJ, -25.2kJ, - 3.56KJ and +31.5kJ . What is the net work for this cyclic process?(CO4, K3) 5
- 3.e. In a Ruby laser, total number of Cr^{3+} ions in excited state is 4.0×10^{19} . If the laser emits radiation of wavelength 8000 Angstroms, calculate energy of laser pulse. (CO5, K3) 5

SECTION-C

20

4. Answer any one of the following:-

- 4-a. Find the differential equation for forced or driven harmonic oscillator and find the solution of it. (CO1, K2) 4
- 4-b. Find the expressions for time period and frequency in simple harmonic motion. (CO1, K2) 4

5. Answer any one of the following:-

- 5-a. Derive an expression for nth bright Newton's ring in transmitted light. (CO2, K2) 4
- 5-b. Describe Fresnel's biprism method to determine wavelength of light. (CO2, K2) 4

6. Answer any one of the following:-

- 6-a. Derive Maxwell's 4th equation. (CO3, K2) 4
- 6-b. Define conductors, semiconductors and insulators. Differentiate between them on the basis of band width. (CO3, K1) 4

7. Answer any one of the following:-

- 7-a. State second law of thermodynamics. How is heat engine different from refrigerator? (CO4, K1) 4
- 7-b. What do you mean by internal energy? On what factors does the internal energy of the gas depend? (CO4, K1) 4

8. Answer any one of the following:-

- 8-a. Discuss the construction and working of a CO₂ laser. (CO5, K2) 4
- 8-b. Discuss light propagation mechanism in optical fiber. (CO5, K2) 4

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