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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 (2025- 2026)

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. In SHM restoring force is proportional to which quantity? (CO1, K2) 1
- (a) Velocity
- (b) Acceleration
- (c) Displacement
- (d) None
- 1-b. Formation of Newton's rings are due to (CO2, K2) 1
- (a) interference by division of amplitude
- (b) interference by division of wave front
- (c) diffraction of light
- (d) none
- 1-c. Equation of Continuity shows conservation of (CO3, K1) 1
- (a) force
- (b) energy
- (c) charge
- (d) momentum
- 1-d. The entropy of an isolated system can never ____ (CO4, K1) 1
- (a) decrease
- (b) be zero
- (c) increase
- (d) none of the above
- 1-e. The material in which population inversion can take place is called (CO5, K2) 1

- (a) Active medium
- (b) Passive medium
- (c) Gaseous medium
- (d) Vapour medium

2. Attempt all parts:-

- 2.a. What are damped oscillations? (CO1, K1) 2
- 2.b. What is Brewster's law? (CO2, K1) 2
- 2.c. Explain briefly n-type semiconductor (CO3, K2) 2
- 2.d. State first law of thermodynamics. (CO4, K1) 2
- 2.e. What is pumping? (CO5, K1) 2

SECTION-B

15

3. Attempt all parts:-

3.a. Answer any one of the following:-

- 3.a.(i) A point is executing SHM with a period of π second. When it is passing through the centre of its path, its velocity is 0.2 m/s. What is its velocity when it is at a distance of 0.03 m from the mean position? (CO1, K3) 3
- 3.a.(ii) A 4 kg mass attached to a spring is observed to oscillate with a period of 2 seconds. What is the period of oscillation if a 6 kg mass is attached to the spring? (CO1, K3) 3

3.b. Answer any one of the following:-

- 3.b.(i) In Young's experiment, the distance between the two slits is 0.8 mm and the distance of the screen from the slits is 1.2 m. If the fringe width is 0.75 mm, calculate the wavelength of light. (CO2, K3) 3
- 3.b.(ii) A certain polarizer has a refractive index of 1.33. Find the polarization angle and angle of refraction? (CO2, K3) 3

3.c. Answer any one of the following:-

- 3.c.(i) An electromagnetic wave travels in a medium with the speed of 2×10^8 m/s. The relative permeability of the medium is 1. Find the relative permittivity of the medium. (CO3, K3) 3
- 3.c.(ii) Derive the expression for equation of continuity. (CO3, K2) 3

3.d. Answer any one of the following:-

- 3.d.(i) Find the change in internal energy of a system if 415 cal of heat is given to the system, and the system does 35 cal of work. (CO4, K3) 3
- 3.d.(ii) A Carnot engine exhausting heat at 77°C is working on 30% efficiency then what must be the temperature of heat supplying reservoir? (CO4, K3) 3

3.e. Answer any one of the following:-

- 3.e.(i) Calculate the energy of a photon of a laser beam of wavelength 6800 Å. (CO5, K3) 3
- 3.e.(ii) Calculate the NA and acceptance angle of a fiber having the following characteristics: core refractive index 1.46 and cladding refractive index 1.40. (CO5, K3) 3

SECTION-C

20

4. Answer any one of the following:-
- 4-a. Find the velocity of a particle at any displacement in simple harmonic motion. (CO1, K2) 4
- 4-b. Derive the expressions for time period and frequency of a mass on a spring system. (CO1, K2) 4
5. Answer any one of the following:-
- 5-a. What is double refraction? Discuss O-ray and E-ray. (CO2, K2) 4
- 5-b. Derive an expression for n^{th} bright Newton's ring in reflected light. (CO2, K2) 4
6. Answer any one of the following:-
- 6-a. Define conductors, semiconductors and insulators. Differentiate between them on the basis of band width. (CO3, K2) 4
- 6-b. Derive Maxwell's 4th equation. (CO3, K2) 4
7. Answer any one of the following:-
- 7-a. What do you mean by internal energy? On what factors does the internal energy of the gas depend? (CO4, K2) 4
- 7-b. Define thermal equilibrium. How does it lead to zeroth law of thermodynamics. (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. Describe the basic principle of an optical fibre. Illustrate the structural parts of optical fibre. (CO5, K2) 4