Printed Page:- 04 **Subject Code:- AAS0201B**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II CARRY OVER THEORY EXAMINATION-AUGUST 2023

Subject: Engineering Physics

Time: 3 Hours **Max. Marks: 100**

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 **20**

1. Attempt all parts:-

1-a. An inertial frame is (CO1) 1

(a) Accelerated

(b) Decelerated

(c) Moving with uniform velocity or at rest

(d) May be accelerated, decelerated or moving with constant velocity

1-b. According to special theory of relativity (CO1) 1

(a) Speed of light is relative

(b) Speed of light is same in all inertial frames

(c) Time is relative

(d) Mass is relative

1-c. Relation Between group velocity and phase velocity is (CO2) 1

(a) $V_P = C^2 V_g$

(b) $V_P V_g = C^2$

(c) $V_P = V_g$

(d) $V_g = C^2 V_p$

1-d. The wave function of the particle lies in which region? (CO 2) 1

(a) $x > 0$

(b) $x < 0$

(c) $0 < X < L$

(d) $x > L$

1-e. Two light sources are said to be coherent if waves produced by them have the same (CO3) 1

(a) Amplitude Only

(b) Wavelength Only

(c) Amplitude and Wavelength

(d) Frequency and constant phase difference

1-f. The diffraction phenomenon is (CO3) 1

(a) Bending of light around an obstacle

(b) Rectilinear propagation of light

(c) Oscillation of light wave in one direction

(d) None of above

1-g. Co-ordination number in case of Simple cubic structure is (CO4) 1

(a) 12

(b) 6

(c) 2

(d) 8

1-h. NaCl crstal belongs to (CO4) 1

(a) SC

(b) FCC

(c) BCC

(d) HCP

1-i. When a material makes the transition from the normal to superconducting state, it actively excludes magnetic fields from its interior, this is known as (CO5) 1

(a) Magnetic levitation

(b) Meissner effect

(c) Josephson effect

(d) None of these

1-j. Carbon nano-tubes can be prepared by (CO5) 1

(a) Arc-evaporation method

(b) Laser ablation method

(c) Chemical vapour deposition method

(d) All of these

2. Attempt all parts:-

2.a. What is the rest mass of Photon? (CO1) 2

2.b. Explain few important properties of matter waves. (CO2) 2

2.c. Why it displays beautiful colours, when a drop of oil is spread on a water surface, in daylight? (CO3) 2

2.d. What do you mean by crystal lattice, basis and crystal structure? (CO4) 2

2.e. What are high temperature superconductors? (CO5) 2

SECTION B **30**

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

3-a. A clock keeps correct time. With what speed should it be moved relative to an observer so that it may be appear to lose 1 hour in 1 day. (CO1) 6

3-b. At what speed the mass of a object will be double of its value at rest. (CO1) 6

3-c. Calculate the energy difference between the ground state and first excited state for electron in one dimensional rigid box of length 10^{-8}cm. (CO2) 6

3-d. Calculate the wavelength associated with 1MeV electron. (CO2) 6

3.e. How many orders will be visible if the wavelength of incident radiation is 5000 Å and the number of lines on the grating is 2620 to an inch? (CO3) 6

3.f. Draw Plane (1,1,1) in cubic crystal. (CO4) 6

3.g. How many types of carbon nanotubes can be obtained depending upon their structure? (CO5) 6

SECTION C **50**

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

4-a. What was the objective of conducting the Michelson – Morley experiment? Describe the experiment. How is the negative result of the experiment interpreted? (CO1) 10

4-b. State Einstein's postulates of special theory of relativity and deduce the Lorentz transformation equations. (CO1) 10

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

5-a. What do you understand by group velocity and phase velocity. Find the expression for Vp and Vg. (CO2) 10

5-b. Define the wave function and give its physical significance. Also, Derive the time independent Schrodinger wave equations. (CO2) 10

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

6-a. Discuss the phenomenon of formation of interference fringes due to thin films and find the condition of maxima and minima. Show that the interference patterns of reflected and transmitted monochromatic light are complementary. (CO3) 10

6-b. Discuss and explain the phenomenon observed by diffraction due to N slit. Also obtain its diffraction pattern. (CO3) 10

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

7-a. Derive Bragg's law for the diffraction of X-rays by crystals. (CO4) 10

7-b. Describe the structure of NaCl crystal. (CO4) 10

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

8-a. Explain Meissner effect. Show that superconductors become perfect diamagnetic in an external magnetic field. (CO5) 10

8-b. Describe the structure, synthesis and properties of Fullerenes. (CO5) 10