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 - THEORY EXAMINATION (2022-2023**)**

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. Either is_____ medium (CO1) 1

(a) Isolated

(b) All pervading

(c) Both

(d) Air on earth

1-b. Length contraction happens only (CO1) 1

(a) Perpendicular to direction of motion

(b) Along direction of motion

(c) Parallel to direction of motion

(d) Both a and b

1-c. Particle velocity is equal to ? (CO2) 1

(a) Phase velocity

(b) Group velocity

(c) Velocity of light

(d) None of these

1-d. Which of the following can be a wave function? (CO2) 1

(a) tan x

(b) sin x

(c) cot x

(d) sec x

1-e. Which of the following sources gives best monochromatic light (CO3) 1

(a) A candle

(b) A bulb

(c) Mercury Lamp

(d) laser Source

1-f. Extended source is needed for (CO3) 1

(a) Young's double slit experiment

(b) Bi prism Experiment

(c) Newton’s Ring Experiment

(d) None of them

1-g. Atomic packing factor for BCC is (CO4) 1

(a) 0.52

(b) 0.74

(c) 0.68

(d) None of these

1-h. The miller indices of plane parallel to x and y axes are (CO4) 1

(a) (1 0 0)

(b) (0 1 0)

(c) (1 1 1)

(d) (0 0 1)

1-i. A normal state and a mixed vortex state is observed (CO5) 1

(a) Only in Type I superconductors

(b) Only in Type II superconductors

(c) In both Type I and Type II superconductors

(d) None of these

1-j. According to recent research, which of the following materials appear to have the highest known thermal conductivity (CO5) 1

(a) Carbon nano tubes

(b) Pure diamond

(c) Single crystalline silicon

(d) Amorphous silicon

2. Attempt all parts:-

2.a.	What do you understand by the terms variants and invariants under Galilean transformation? (CO1)	2
2.b.	what do you understand by wave particle duality. (CO2)	2
2.c.	Differentiate between constructive and destructive interference. (CO3)	2
2.d.	Define atomic packing factor. (CO4)	2
2.e.	Define critical temperature and critical magnetic field. (CO5)	2

SECTION B **30**

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

3-a.	The proper life of a meson is 2×10^{-8} sec. Calculate the mean life of a meson moving with a velocity of 0.8c. (CO1)	6
3-b.	Find the velocity of a particle if its kinetic energy is three times of its rest mass energy. (CO1)	6
3-c.	Calculate the smallest possible uncertainty in the position of an electron moving with velocity 3×10^{7}m/s. (CO2)	6
3-d.	Find the probability of finding a particle trapped in a box of length L in the region from 0.45L to 0.55L for the ground state. (CO2)	6
3.e.	What would be the minimum thickness for a film appear to be seen (i) dark and (ii) bright by wavelength 5500 Å in transmitted mode? The refractive index of layer is 1.334. (CO3)	6
3.f.	What is the interplaner spacing between (200), (220) and (111) planes in simple cubic having lattice constant 1.246 A. (CO4)	6
3.g.	Find the difference between type - I and type - II superconductors. (CO5)	6

SECTION C **50**

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

4-a.	What is proper length. Show that the apparent length of a rigid body in the direction of its motion with uniform velocity v is reduced by the factor $\sqrt{(1-v^2/c^2)}$. (CO1)	10
4-b.	Deduce the relativistic velocity addition theorem. Show that it is consistent with Einstein's second postulate of special theory of relativity. (CO1)	10

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

5-a.	What do you understand by a wave function. Derive an expression for the normalised wave function and energy of a particle confined in one dimensional box. (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.	What is the difference between dispersive power and resolving power of a grating. Find the expression for resolving power of grating. (CO3)	10

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

7-a.	Calculate packing factor for (i) Simple Cubic (SC) (ii) Body Centered Cubic (BCC) and (iii) Face Centered Cubic (FCC) crystal structure. (CO4)	10
7-b.	Explain the crystal structure of diamond and find its atomic packing factor. (CO4)	10

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

8-a.	Describe Structure and properties of carbon nanotubes. (CO5)	10
8-b.	Explain superconductivity and cooper pair formation on the basis of BCS theory. (CO5)	10