Printed Page:- 04 **Subject Code:- BAS0201B**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION - (2023- 2024)

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. Decay of μmesons supports: (CO1) 1

(a) Length contraction

(b) Time dilation

(c) mass energy equivalence

(d) variation of mass with velocity

1-b. Which basic law is used for the derivation of mass variation with velocity? (CO1) 1

(a) Law of conservation of Energy

(b) Law of conservation of Kinetic Energy

(c) Law of conservation of Momentum

(d) Law of conservation of mass

1-c. The wavelength of the matter wave is independent of: (CO2) 1

(a) Mass

(b) Velocity

(c) Momentum

(d) Charge

1-d. According to wave mechanics, a material particle is associated with: (CO2) 1

(a) A single wave

(b) A wave packet

(c) Two progressive waves travelling in the same direction

(d) A ripple

1-e. The incident wavefronts in Fresnel and Fraunhofer Diffraction are respectively _____ (CO3) 1

(a) Planar and Planar
(b) Planar and cylindrical
(c) Cylindrical and Planar
(d) Cylindrical and Cylindrical

1-f. The interference phenomenon can take place (CO3) 1

(a) In transverse waves only
(b) In Longitudinal waves only
(c) In standing waves only
(d) All 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. Intercepts of a plane in crystal is given by a, b/2, 3c in a simple cubic unit cell, Miller indices are (CO4) 1

(a) (1 3 2)
(b) (2 6 1)
(c) (1 2 3)
(d) (3 6 1)

1-i. The magnetic susceptibility of a superconductor is (CO5) 1

(a) -1
(b) 1
(c) 0
(d) None of these

1-j. The third known form of pure carbon is (CO5) 1

(a) Fullerene
(b) Diamond
(c) Graphite
(d) None of these

2. Attempt all parts:-

2.a. What do you understand by frame of reference? What are their types? (CO1) 2

2.b. How do matter waves differ from electromagnetic waves? (CO2) 2

2.c. What do you mean by incoherent sources? (CO3) 2

2.d. What is the difference between crystalline and amorphous solids? (CO4) 2

2.e.	What is the phenomenon of superconductivity? (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	How fast would a rocket have to go relative to an observer for its length to contracted to 99% of its length at rest? (CO1)	6
3-b.	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-c.	An electron has de-Broglie wavelength 2×10^{-12} m. Find its kinetic energy (CO2)	6
3-d.	Calculate the smallest possible uncertainty in the position of an electron moving with velocity 3×10^{7}m/s. (CO2)	6
3.e.	Newton's rings are observed in the reflected light of wave length 5900 Å. The diameter of 10th dark ring is 0.6 cm. Find the radius of curvature of the lens used. (CO3)	6
3.f.	Calculate the inter planner spacing for (1 0 1) plane in a simple cubic crystal whose lattice constant is 0.42 nm. (CO4)	6
3.g.	Define critical temperature and critical magnetic field. (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Derive the relation for variation in mass with velocity. (CO1)	10
4-b.	Derive Einstein's mass energy relation. Give some evidence showing its validity. (CO1)	10

5. Answer any one of the following:-

5-a.	Distinguish between phase velocity and group velocity. Prove that wave group associated with moving particle travels with same velocity as that of particle? (CO2)	10
5-b.	Using uncertainty principle calculate the binding energy of electron in hydrogen atom. (CO2)	10

6. Answer any one of the following:-

6-a.	Discuss the phenomenon of interference of light due to thin films of uniform thickness in reflected light. (CO3)	10
6-b.	Discus the phenomenon of Fraunhofer diffraction at single slit and find the relative intensities of successive maximas. (CO3)	10

7. Answer any one of the following:-

7-a.	Deduce the number of lattice point per unit cell in simple cubic, body centered and face centered cubic lattices. (CO4)	10
7-b.	Show that Face Centered Cubic (FCC) is the most closely packed cubic crystal structure. (CO4)	10

8. Answer any one of the following:-

8-a.	What are types of superconductors. Explain each with examples. (CO5)	10

8-b. Describe C_{60} buckyballs. Give some properties and uses of Buckyballs. (CO5) 10