PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2022-23 Examination

Semester: 1   **Date: 31/01/2023**
Subject Code: 303192101   **Time: 02:00 pm to 04:30 pm**
Subject Name: Engineering Physics I   **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Fill in the blanks, one word answer, MCQ-not more than Five in   **(15)**
case of MCQ) (All are compulsory) (Each of one mark)
1.   If the probability of finding the electrons in the excited state is more than the ground state then
it is called as _____.
(a)   Population inversion (b) Absorption (c) Emission (d) All of these. _____.
2.   He-Ne Laser is _____ Laser.
(a) Solid (b)Liquid (c) Gaseous (d) None of these.
3.   Number of Oscillations per second is called_____.
(a) Frequency (b) Wavelength (c) Period (d) Amplitude
4.   Rate of change of linear momentum is called _____ as per Newton's second law of motion.
(a) Energy (b) Angular momentum (c) Force (d) Power
5. Hooke's law essentially defines_____
(a) Stress (b) strain (c) Elastic limit (d) None of these.
6. Define: Elasticity
7. The lifetime of a normal excited state is_____ seconds.
8. What is Wavelength?
9. Define: Restoring force.
10. A wave has a frequency of 50 Hz and a wavelength of 10 m. What is the speed of the wave?
11. The velocity of sound will be greatest in metal. True or False
12. The ratio of longitudinal stress to linear strain is called_____.
13. LASER is a short form of _____.
14. The spontaneous emission produces _____ light. (Coherent light / Incoherent light)
15. according to Newton's third law, action and reaction always have _____ direction.

Q.2 Answer the following questions. (Attempt any three)   **(15)**
A) List the differences between inertial frame of reference and Non inertial frame of reference.
B) What is Phonon? Explain its types with detailed diagram.
C) "The scalar quantity remains unchanged under the vector transformation" prove this statement
considering rotation about Z axis,
D) Mention any three properties of Laser with explanation.

Q.3 A) Write a detailed note on Nd:YAG laser and also explain its working and applications with   **(07)**
necessary diagram.
B) Explain standing waves along the string and derive the expression for Eigen values and eigen   **(08)**
frequencies.

OR

B) Differentiate: Stress and Pressure and also explain Hooke's law for the relationship between   **(08)**
Stress and Strain.

Q.4 A) An army recruit on a training is instructed to work 5 kms west, 4 kms North East direction and   **(07)**
finally 3 kms North. find resultant displacement $\vec{R}$. how far it will be from origin.

OR

A) A wire is rotating with an angular speed ω in a plane. A bead is placed at a distance r_0 from   **(07)**
center with respect to which the wire is rotated. Calculate the change in position of the bead
with respect to time and the velocity of the bead with respect to time.
What will be the force applied by the bead on the wire?
B) Explain Newton's laws of motion (All three) in detail.   **(08)**