

SECTION - D

8. (a) Write Lorentz transformation equations and derive length contraction. **8**
- (b) Derive mass energy equivalence i.e. $E = mc^2$ **12**
9. (a) Write short notes on type-1 and type-2 superconductor and write some possible applications of superconductors. **10**
- (b) Derive London equations and discuss how its solution leads to Meissner effect. **10**

Roll No.

24003

B. Tech. 1st Semester (Common for All Branches) Examination – February, 2022

PHYSICS-I

Paper: Phy-101-F

Time: Three Hours]

[Maximum Marks: 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note: Attempt five questions in all and each question carries equal marks (20 marks). Select one question from each Section but first question is compulsory.

1. (a) What do you mean by coherent sources? **2**
- (b) Define optical pumping. **2**
- (c) Define half wave plate. **2**
- (d) What do you mean by phenomenon of double refraction? **2**

- (e) Explain population inversion 2
- (f) Define optical fiber and write its principle 2
- (g) Define polar and non-polar dielectrics. 2
- (h) What do you mean by superconductor ? 2
- (i) What is the velocity of the particle if its total energy is twice the rest energy ? 2
- (j) Define angle of polarization and write its relation with refractive index. 2

SECTION - A

- 2. (a) Write conditions for sustained interference of light waves 5
- (b) What are Newton's rings ? Describe the construction, principle, theory and applications Newton's rings experiment. 15
- 3. What do you mean by diffraction grating ? Derive intensities and angular positions of minima's and maxima's of diffraction pattern obtained through the diffraction grating. 20

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- SECTION - B**
- 4. (a) What is polarization ? Describe construction, working and applications of Nicol prism. 10
 - (b) What is specific rotation ? Describe the construction and working of Laurent's half shade polarimeter and explain its limitations. 10

- 5. (a) Write short notes on the characteristics Laser radiations. 8
- (b) Describe the principle, construction and working of He-Ne Laser. 12

SECTION - C

- 6. (a) Define angle of acceptance and numerical aperture and derive their expressions. 12
- (b) Write short notes on single mode step index, multimode step index and multimode graded index optical fibers. 8
- 7. (a) Define electrical displacement vector (\vec{D}), electric polarization vector (\vec{P}) and electric field intensity (\vec{E}) and derive their relation. 10
- (b) Derive the expression of electric energy density in dielectric medium. 10

24003-1250-(P-4)/(O-9)/22 (3) P. T. O.