SECTION – D

8. (a) Derive Lorentz Transformation equations. 12

(b) A particle of rest mass m_0 moves with speed $\frac{\sqrt{3}}{2}C$. Calculate its mass, momentum, total energy and kinetic energy. 8

9. (a) Derive London equations and London penetration depth in super conductors. 12

(b) Derive Einstein's energy-mass relation i. e. $E = mc^2$. 8

Roll No. .....

24003

B. Tech 1st Semester (Common for All Branches) Examination – December, 2018

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, by selecting ***one*** Question from each Section. Question No. **1** is ***compulsory.*** All questions carry equal marks.

1. (a) What do you mean by division of wave front and division of amplitude ?

(b) Define quarter wave plate.

(c) Discuss about Rayleigh criterion of resolution.

(d) What are differences between Fraunhofer and Fresnel's diffraction ?

(e) What do you mean by pumping and population inversion ?

(f) Define Total Internal Reflection and write down its conditions.

(g) If relative permittivity of a di-electric medium is 1.7 then find out values of electric susceptibility of given medium.

(h) Write down Einstein postulates of special theory of relativity.

(i) At what temperature, the critical field of a material become $\frac{5}{9}$ times of the critical field at 0K ? Given that the transition temperature of material is 6 K.

(j) Write down any four applications of LASER.

$2 \times 10 = 20$

SECTION – A

2. (a) What are Newton's rings ? Derive expressions for diameter of dark and bright rings. Explain how this experiment help to find out wavelength of monochromatic light source. 15

(b) In Fresnel biprism expériment, fringe width observed on screen is 0.195 mm. What will be fringe width if distance of biprism from slit is reduced to 0.75 times the original distance provided distance between slit and screen is kept unchanged. 5

3. (a) Explain intensity distribution of Fraunhofer single slit diffraction by neat ray diagram and mathematical expressions. 15

(b) Define dispersive power of diffraction grating and derive its expression. 5

SECTION – B

4. (a) Discuss construction and action of Nicol prism. 10

(b) Describe different parts and working of Laurent's half shade polarimeter. 10

5. (a) Explain working of He-Ne LASER with energy level diagram. 12

(b) Define stimulated absorption, stimulated emission and spontaneous emission. Derive relation between Einstein's coefficients. 8

SECTION – C

6. (a) Define acceptance angle and numerical aperture (N. A.) and derive their expressions. 10

(b) Derive expression for electrostatic energy stored in dielectric. 10

7. (a) Explain electric vectors : electric intensity $(\vec{E})$, electric polarization $(\vec{P})$ and electric displacement $(\vec{D})$. Establish a relation between them. 10

(b) Derive Claussius-Mosotti relation. 10