

**B.Tech. 1st Semester (F-Scheme) Examination,****December-2011****PHYSICS-I****Paper-Phy-101-F**Time allowed : 3 hours ][ Maximum marks : 100

*Note : Attempt five questions in all. First question is compulsory and select one question from each section. First question contain ten sub questions. Each sub question carries equal marks.*

1. (a) What do you understand by blooming ? 2
- (b) What are the conditions for good interference pattern ? 2
- (c) What is the difference between Fresnel and fraunhofer differaction. 2
- (d) Explain the statement light added to light can produce darkness. 2
- (e) Differentials between polarized and unpolarized light. 2
- (f) What do you understand by laser action ? 2
- (g) What do you understand by Inertial frame of reference and non-inertial frame of reference ? 2



- (h) Find energy corresponding to rest mass of positron [mass of positron =  $9.1 \times 10^{-31}$  kg]. 2
- (f) Why is compensated glass is used in Michelson Morley Experiment ? 2

### Section-A

2. Explain how the formation of Newton's ring by (a) transmitted and (b) reflected light. Derive the expression of nth dark ring. What type of fringes are observed with white light. 20
3. (a) What is resolving power ? What do you understand by Reyleigh limit of resolution ? Find out the resolving power of diffraction grating and on what factor it depends. 10
- (b) Explain the fraunhofer diffraction through single slit experiment. 10

### Section-B

4. (a) State and explain Law of Malus. 10
- (b) Explain the term optical activity. Show how Fresnel theory explain the optical rotation. 10



5. (a) Explain Principle, construction and theory of He-Ne Laser in detail. 10
- (b) Explain the term optical pumping, stimulated and spontaneous emission. Explain the Ruby laser in detail. 10

### Section-C

6. Explain the principle of optical fibers. How the terms angle of acceptance and numerical aperture are used in optical fibres. Explain single and multimode fibres. Explain the medical and communication applications. 20
7. (a) Find out the expression of Gauss Law in electrostatics. 10
- (b) Derive the relations :
- (i)  $\vec{E} = \frac{\vec{E}_0}{K}$
- (ii)  $\vec{D} = \epsilon_0 \vec{E} + \vec{P}$

Where D is displacement vector, P is polarisation vector,  $\vec{E}$  is Electric field with dielectric.  $E_0$  is electric field without dielectric.  $K$  is dielectric constant.  $\epsilon_0$ -relative permittivity. 10



## Section-D

8. (a) Show that  $x^2 + y^2 + z^2 - c^2 t^2$  is invariant under Lorentz transformation. 4
- (b) Derive formula for variation of mass of particle with velocity. 10
- (c) Prove that law of conservation of Energy and momentum are invariant under Lorentz transformation. 6
9. (a) Derive the London equation and discuss now its solution explain Meissner effect and flux penetration. 10
- (b) Differentiate between hard and soft superconductors. 6
- (c) Explain the elements of BCS theory. 4