I B. Tech I Semester Supplementary Examinations, December 2021
APPLIED PHYSICS
(Com. to ECE, CSE, IT, EIE, E Com E)

Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 70

Note: 1. Question paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**
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PART –A

1.　a)　Write the principle of the interferometer.　　　　　　　　　　　　(2M)

　　b)　What is an optical grating?　　　　　　　　　　　　　　　　　　(2M)

　　c)　How quarter wave plate works in finding the thickness of the plate?　(2M)

　　d)　Define scalar and vector fields.　　　　　　　　　　　　　　　　(2M)

　　e)　State the postulates of the quantum free electron theory.　　　　　(2M)

　　f)　What is an active medium?　　　　　　　　　　　　　　　　　　(2M)

　　g)　Establish the relationship between diffusion coefficient and mobility of charge　(2M)
　　　　carriers.

PART -B

2.　a)　Explain how Newton's rings are formed? Derive an expression for the radius of　(10M)
　　　　curvature of a plano-convex lens.

　　b)　When Newton's rings are observed in the reflected light of wavelength 5900 Å,　(4M)
　　　　then the diameter of the 10th dark ring is found to be 0.5 cm. Calculate
　　　　(i) the radius of curvature of the lens and　　　(ii) the thickness of the air film.

3.　a)　What is the limit of resolution? Deduce an expression for it in the case of a　(10M)
　　　　telescope.

　　b)　What is a diffraction grating and explain its importance?　　　　　(4M)

4.　a)　Explain the construction, working and energy level diagram of Ruby Laser.　(10M)

　　b)　What is a quarter wave plate? Explain its working.　　　　　　　(4M)

5.　a)　Deduce the equation for the propagation of plane electromagnetic waves in the　(10M)
　　　　free space.

　　b)　State the Gauss's and Stoke's theorems.　　　　　　　　　　　　(4M)

6.　a)　Discuss the variation of Fermi Factor with temperature and energy.　(10M)

　　b)　What is the condition for the normalized wave function? Describe in detail.　(4M)

7.　a)　Derive an equation for charge carrier concentration of conduction band of an　(10M)
　　　　intrinsic semiconductor.

　　b)　Write any four applications of hall effect.　　　　　　　　　　　(4M)