

**I B. Tech I Semester Supplementary Examinations, August/Sep - 2022****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 Compulsory3. Answer any **FOUR** Questions from **Part-B****PART -A**

1. a) A thin film of oil appears multicoloured under white light. Explain why? (2M)
- b) How diffraction is different from interference? (2M)
- c) Write notes on Stimulated emission. (2M)
- d) In Nicol's prism, for which ray Canada balsam acts as a rarer medium? Explain why? (2M)
- e) Write the Maxwell's equations in differential form. (2M)
- f) What are the drawbacks of the classical free electron theory? (2M)
- g) What are the majority and minority charge carriers in n-type semiconductors? (2M)

**PART -B**

2. a) Explain the phenomenon of interference. What are the necessary conditions for obtaining sustained interference fringes? (7M)
- b) Give the analytical treatment of interference of light and hence obtain the condition for maximum and minimum intensity. (7M)
3. a) Give the theory of Fraunhofer diffraction due to a double slit. (10M)
- b) Light of wavelength,  $\lambda=5 \times 10^{-5}$  cm is incident normally on a plane transmission grating of width 3 cm and 15000 lines. Find the angle of diffraction in first order. (4M)
4. a) What are the characteristic properties of LASER? (4M)
- b) With neat diagrams, describe the construction and working of He-Ne laser. (10M)
5. a) What are the quarter and half wave plates? Derive the expressions for thickness of quarter and half wave plates. (10M)
- b) The refractive index of calcite for ordinary ray is 1.658 and for extra ordinary ray it is 1.486. The slice having the thickness  $0.9 \times 10^{-4}$  cm is cut from the crystal. For what wavelength this slice acts as half wave plate? (4M)
6. a) State and explain Bloch theorem. (4M)
- b) Explain the formation of allowed and forbidden energy bands on the basis of the Kronig-Penny model. (10M)
7. a) State and explain Hall effect. Derive expression for Hall coefficient. (10M)
- b) Illustrate the applications of Hall effect. (4M)