Hall Ticket No | | | | | | | | | | |

Question Paper Code: AHSC03

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech I Semester End Examinations (Regular) - July, 2021

Regulation: UG-20

ENGINEERING PHYSICS

Time: 3 Hours **(ECE|EEE|AE|ME|CE)** **Max Marks: 70**

Answer all questions in Module I and II
Answer ONE out of two questions from Modules III, IV and V
All questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Enumerate the application of Schrodinger wave equation in one-dimensional potential well. **[7M]**
   (b) Calculate the velocity and kinetic energy of an electron having wavelength of 0.21nm. **[7M]**

MODULE – II

2. (a) What are acceptor type of impurities and what is a P-type semiconductor? Explain how phosphorous atoms donate electrons to the conduction band. **[7M]**
   (b) The intrinsic carrier density at room temperature in Ge is $2.37 \times 10^{19}/m^3$. If the electron and hole mobilities are 0.38 and $0.18 m^2V^{-1}s^{-1}$ respectively. Calculate the resistivity. **[7M]**

MODULE – III

3. (a) Discuss the different mechanisms involved to produce laser emission. **[7M]**
   (b) The CO_2 laser is one of the most powerful lasers. The energy difference between the two levels is 0.117eV. Determine the frequency and wavelength of radiation. **[7M]**

4. (a) Explain the different types of optical fibers and their properties. **[7M]**
   (b) Draw the conditions for the light propagation through optical fibers and hence explain the following terms
   i) Critical incident angle ii) Acceptance angle iii) Numerical aperture. **[7M]**

MODULE – IV

5. (a) Explain how Newton's rings are formed and describe the method for the determination of wavelength of light with their use. **[7M]**
   (b) In Young's double slit experiment the separation of the slits is 1.9 mm and the fringe spacing is 0.31 mm at a distance of 1 metre from the slits. Calculate the wavelength of light.

6. (a) Describe and explain the Fraunhofer single diffraction pattern obtained with a narrow slit and illuminated by a parallel beam of monochromatic light. **[7M]**
   (b) Calculate the least width of a plane diffraction grating having 500 lines/cm, which will just resolve in the second order the sodium lines of wavelengths 5890 A^0 and $5896 A^0$. **[7M]**

MODULE – V

7. (a) Derive the differential equation of a damped harmonic oscillator and discuss the different cases of damping. **[7M]**

   (b) Deduce the expression for the velocity of transverse waves on a long stretched string. **[7M]**

8. (a) What do you understand by wave motion? What are transverse and longitudinal waves? Give examples of each. **[7M]**

   (b) A massless spring of spring constant 10Nm^{-1} is suspended from a rigid support and carries a mass of 0.1kg at its lower end. The system is subjected to a resistive force pv, where p is a constant and v is the velocity. It is observed that the system performs damped oscillatory motion and its energy decays to 1/e of its initial value is 50s.
   i) What is the value of p?
   ii) What is the Q value of the oscillator? **[7M]**

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