



# MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi &amp; Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade &amp; Recognized Under Section 2(f) &amp; 12(B) of the UGC act, 1956

I B.Tech I Sem Supply End Examination, October 2022

**Applied Physics**

(ECE, CSC, CSD)

**Time: 3 Hours.****Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.

2. In Part – A, answer all questions which carries 20 marks.

3. In Part – B, answer any one question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

**PART- A****(10\*2 Marks = 20 Marks)**

- |       |  |    |     |    |
|-------|--|----|-----|----|
| 1. a) | Define Photoelectric effect and mention its importance.  | 2M | CO1 | R  |
| b)    | Explain the de-Broglie's hypothesis.   | 2M | CO1 | U  |
| c)    | Distinguish between Intrinsic and Extrinsic semiconductors.                                    | 2M | CO2 | An |
| d)    | Sketch the p-n junction diode's V-I Characteristics.   | 2M | CO2 | Ap |
| e)    | List the properties of Solar Cell.   | 2M | CO3 | R  |
| f)    | Name the material that is used in the PIN diode.   | 2M | CO3 | U  |
| g)    | Justify your answer why population inversion is necessary for lasing action.                   | 2M | CO4 | An |
| h)    | Define Acceptance angle and relate the expressions of acceptance angle and numerical aperture. | 2M | CO4 | U  |
| i)    | Define Permittivity and mention its importance in dielectrics.                                 | 2M | CO5 | R  |
| j)    | Illustrate Hysteresis in magnetic materials.   | 2M | CO5 | U  |

**PART- B****(10\*5 Marks = 50 Marks)**

- |      |   |    |     |    |
|------|---|----|-----|----|
| 2 a) | Describe the Davisson and Germer experiment with the help of neat sketch.   | 5M | CO1 | U  |
| b)   | Apply the concept of wave particle duality to the material particle and obtain the Schrodinger's time independent wave equation for it. | 5M | CO1 | Ap |

**OR**

- |      |  |    |     |    |
|------|--|----|-----|----|
| 3 a) | Consider a particle of mass 'm' trapped in one dimensional box of infinite depth. Employ the steady state Schrodinger's wave equation to obtain permissible energy states of the particle. | 5M | CO1 | An |
| b)   | Obtain de-Broglie wavelength for an electron in terms of its kinetic energy. Calculate the de-Broglie wavelength of an electron whose kinetic energy is 10eV.                              | 5M | CO1 | Ap |

- |           |  |     |     |    |
|-----------|--|-----|-----|----|
| 4         | a) Differentiate between diffusion current and drift current.  | 5M  | C02 | An |
|           | b) Interpret the working of Zener diode and its V-I Characteristics with the help of necessary diagrams.   | 5M  | C02 | An |
| <b>OR</b> |  |     |     |    |
| 5         | Interpret the principle of operation, Construction and working of Bipolar Junction Transistor (BJT) along with its characteristics with the help of necessary diagrams.                | 10M | C02 | E  |
| 6         | a) Compare the Radiative and non-radiative recombination mechanisms in semiconductors.   | 5M  | C03 | An |
|           | b) Describe the structure, Characteristics and figures of merit of LED with suitable figures.  | 5M  | C03 | U  |
| <b>OR</b> |  |     |     |    |
| 7         | Interpret the working principle, construction and working of Avalanche photodiode along with its characteristics with the help of necessary diagrams. Mention its merits and demerits. | 10M | C03 | An |
| 8         | a) Differentiate between spontaneous and stimulated emissions. Illustrate the energy level diagram indicating various radiation transitions occurred in He-Ne laser.                   | 5M  | C04 | Ap |
|           | b) Illustrate the vibrational energy level diagram indicating various radiation transitions occurred due to various modes of vibrations in Ruby laser.                                 | 5M  | C04 | Ap |
| <b>OR</b> |  |     |     |    |
| 9         | a) Discuss the various types of losses occur during data transmission through optical fibre with the help of appropriate diagrams.   | 5M  | C04 | An |
|           | b) Calculate the numerical aperture and acceptance angle of given optical fibre, if the core and cladding refractive indices are 1.55 & 1.5  | 5M  | C04 | E  |
| 10        | a) Distinguish between Ferroelectrics and Piezoelectrics.  | 5M  | C05 | An |
|           | b) Define below terms:<br>i) dielectric constant<br>ii) Polarization<br>iii) Electric dipole   | 5M  | C05 | Ap |
| <b>OR</b> |  |     |     |    |
| 11        | a) Illustrate the various kinds of magnetic materials with their alignment of magnetic domains.  | 5M  | C05 | An |
|           | b) List the various applications of magnetic materials and explain them.   | 5M  | C05 | U  |