



R22 Regulation

Subject code: 4B2AN

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech II Semester Regular/Supplementary Examinations, July 2025

APPLIED PHYSICS

(Common to CSE, CSE(AI&ML) & CSE(DS))

Maximum Marks: 60

Date:17.07.2025

Duration: 3 hours

- Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

Table with 5 columns: Question ID, Question Text, Marks, CO, BTL. Contains 10 questions (1.a to j) related to wave-particle duality, Heisenberg's principle, Fermi level, forbidden gap, extrinsic semiconductors, Hall effect, Photovoltaic effect, electroluminescence, optical fibers, and Hilbert space.

Part-B

Table with 5 columns: Question ID, Question Text, Marks, CO, BTL. Contains 5 questions (2 to 5) related to matter waves, wave function, Schrödinger equation, free electron theories, and band theory.

6	a) Differentiate between intrinsic and extrinsic semiconductors with suitable examples. b) Derive an expression for electron carrier concentration in an intrinsic semiconductor.	3M 7M	3 3	2 3
OR				
7	a) Draw and explain the V-I characteristics of a PN junction diode under forward and reverse bias. b) Explain how the Hall effect helps in determining the type of charge carriers in a semiconductor material.	3M 7M	3 3	4 2
8	a) Illustrate and explain the differences between direct and indirect band gap semiconductors using suitable energy band diagrams. b) With a suitable diagram, explain the structure, operation, and I-V characteristics of a solar cell.	3M 7M	4 4	2 2
OR				
9	a) Discuss qualitatively the various types of polarization that occur in dielectric materials. b) What are ferroelectric, piezoelectric, and pyroelectric materials? Explain each with suitable examples and applications.	4M 6M	4 4	2 3
10	a) Describe the construction and working principle of an optical fiber with a neat diagram. b) Derive the expression for numerical aperture and acceptance angle in an optical fiber.	3M 7M	5 5	2 3
OR				
11	a) Define superposition and entanglement in quantum systems. b) Describe the role of multiple qubit CNOT gate in quantum computing.	3M 7M	5 5	2 4