R25 Regulation *Subject code:5BS2AB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Regular Examinations, June 2026

ADVANCED ENGINEERING PHYSICS

(Common to CE, EEE, ECE, IT & CSE(DS))

Maximum Marks: 60 Date:17.06.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 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

All the following questions carry equal marks (5X2M=10Marks)		Marks	CO	BTL
1.a	Define operator in quantum mechanics.	2M	1	1
b	Sketch the (100) and (110) planes of a cubic unit cell.	2M	2	3
c	Differentiate classical bits and qubits.	2M	3	2
d	Mention the applications of piezoelectric materials.	2M	4	1
e	Classify the types of optical fibers.	2M	5	2

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	a) Discuss the postulates of quantum mechanics. b) Derive Schrödinger time independent wave equation.	3M 7M	1	2 3
	OR			
3	a) Derive the expression for the effective mass of an electron using the E-k diagram. b) Compare conductors, semiconductors and insulators based on band theory.	5M 5M	1	3 4
4	a) Explain unit cell, space lattice and basis with suitable examples. b) Describe Bravais lattices and explain their importance in crystallography.	5M 5M	2	2 2
	OR			
5	a) Explain the concept of surface-to-volume ratio and discuss its importance in nanomaterials. b) Derive Bragg's law and explain its significance in X-ray diffraction studies.	3M 7M	2	2 3
6	a) Explain Dirac's Bra and Ket notation with suitable examples. b) Describe single qubit and multiple qubit gates with examples.	5M 5M	3	2 4
	OR			

7	a) Discuss the concept of quantum entanglement with suitable examples. b) Explain Deutsch-Jozsa quantum algorithm and its significance.	4M 6M	3	2 3
8	a) Classify magnetic materials with suitable examples. b) Explain Weiss domain theory of ferromagnetism.	5M 5M	4	2 2
	OR			
9	a) Discuss electronic polarization and ionic polarization with suitable examples. b) Compare ferroelectric, piezoelectric and pyroelectric materials.	5M 5M	4	2 4
10	a) Discuss the properties of laser light and their significance. b) Explain the construction and working principle of He-Ne laser.	5M 5M	5	2 3
	OR			
11	a) Define numerical aperture and derive its expression for an optical fiber. b) Compare single-mode and multi-mode optical fibers.	5M 5M	5	3 4