

VISWAJYOTHI COLLEGE OF ENGINEERING AND TECHNOLOGY (Autonomous)
FIRST SEMESTER B.TECH DEGREE EXAMINATION DECEMBER 2025 (2025 SCHEME)

Course Code: 25VJGBPHT121

Course Name: PHYSICS FOR ELECTRICAL SCIENCE

Max. Marks: 60

Duration: 2 Hours 30 Minutes

PART A

<i>Q.No.</i>	<i>Answer all questions. Each question carries 3 marks</i>	<i>CO</i>	<i>Marks</i>
1	Explain the formation of n-type semiconductors	CO1	(3)
2	Draw energy band diagram of pn junction	CO1	(3)
3	Explain the process of zener breakdown in diodes.	CO2	(3)
4	What is meant by stringing of solar cell?	CO2	(3)
5	Briefly explain dielectric breakdown.	CO3	(3)
6	What is dielectric constant and dielectric polarisability?	CO3	(3)
7	Explain the principle of propagation of light through optical fiber	CO4	(3)
8	Differentiate between spontaneous emission and stimulated emission.	CO4	(3)

PART B

Answer any one full question from each module. Each question carries 9 marks

Module 1

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| 9 | Derive the diode equation that establishes the relationship between the current flowing through the diode and the applied biasing voltage. | CO1 | (9) |
| 10 | a) Derive an expression for density of electrons in conduction band of intrinsic semiconductors. (6marks)
b) Draw energy level diagrams of semiconductor, insulator and conductor. (3marks) | CO1 | (9) |

Module 2

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| 11 | a) Explain the construction and working of LED. (6marks)
b) Give any six advantages of LED. (3marks) | CO2 | (9) |
| 12 | a) With labelled diagram, explain the working of half wave rectifier. (6marks)
b) Derive an expression for efficiency of half wave rectifier. (3marks) | CO2 | (9) |

Module 3

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|----|--|-----|-----|
| 13 | a) Define critical temperature and critical magnetic field. Write the relation connecting them. (5 marks)
b) Calculate the critical field of a metal at 10K. T_c is 17.25K and $H_c(0)$ for metal is 8.5×10^4 A/m. (4 marks) | CO3 | (9) |
| 14 | a) Discuss BCS theory of superconductivity. (6 marks)
b) Mention any six applications of superconductors. (3 marks) | CO3 | (9) |

Module 4

- 15 a) Derive an expression for numerical aperture considering a step index fibre. CO4 (9)
(6 marks)
b) Calculate the acceptance angle of a fibre with a core of refractive index 1.54 and that of cladding 1.50. The fibre is immersed in water (refractive index 1.33). (3 marks)
- 16 Write short note on population inversion, pumping, metastable state and optical resonator in a laser system with reference to Ruby laser. CO4 (9)
