Subject Code: 01GS1101
Subject Name: Engineering Physics (Semester I/ II)
Branch: (B. Tech of Computer, IT, EC, Electrical)

Objective: The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.

Credits Earned: 4
Course Outcomes: After completion of this course, student will be able to:

- Understand basic physics of semiconductors and use it in various engineering applications.
- Acquire knowledge of magnetic materials.
- Obtain knowledge of mechanism of various lasers and apply it for optical fibre communication.
- Prepare different basic logic gate circuits and check its application in various engineering fields.
- Apply various numerical analysis methods to solve scientific problems/develop mathematical models.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal (I)	Viva (V)	Term work (TW)	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	**Electronic Materials**: Introduction, Free electron theory, Types of electronic materials: metals, semiconductors, and insulators Density of states and energy band diagrams, Kronig-Penny model, Energy bands in solids, E-k diagram, Direct and indirect bandgaps,Occupation probability, Fermi level, Effective mass.	10
2	**Semiconductor Physics:** Intrinsic and extrinsic semiconductors,Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Optical loss and gain; Photovoltaic effect, Solar cell.	7

3	**Magnetic Materials**: Definitions : Magnetic induction, Auxiliary Magnetic field, Magnetic dipole, Dipole moment, Magnetization, Magnetic parameters, Bohr magnetron, Classification of Magnetic Materials based on magnetic moment, Soft and Hard Magnetic Materials, Anti-ferromagnetic materials, Ferrites, Magnetic recording and readout, Magnetic storage devices.	8
3	**Lasers:** Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, He-Ne laser, Applications of laser. **Fibre Optics:** Introduction, , Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres	11
4	**Digital electronics:** Introduction – Logic levels – Basic logic gates: OR, AND , NOT gates – Universal logic gates:NAND and NOR gates – Symbolic representation, Boolean expression and Truth table for all above logic gates – Integrated circuits– Levels of integration – SSI, MSI, LSI and VLSI-Advantages of ICs.	10
5	**Numerical Methods:** Representations of numbers: Roundoff error, truncation error, significant error, error in numerical computations. Solution of transcendental and algebraic equations: Bisection, secant, Regula Falsi, fixed-point, Newton-Raphson, Graffe's methods.	8
	Total Hours	54

References:

1. Engineering Physics by Dattu R Joshi, McGraw hill Publications.
2. Principles of Lasers by O. Svelto
3. Optics – AjoyGhatak (TMH)
4. Fundamentals of Physics – Resnick & Halliday (Asian Book)

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember	Understand	Apply	Analyse	Evaluate	Create
20%	20%	35%	10%	10%	5%

Instructional Method:

a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, case studies etc.
b. The internal evaluation will be done on the basis of continuous evaluation of students in the class-room.
c. Practical examination will be conducted at the end of semester for evaluation of performance of students in classroom.
d. Students will use supplementary resources such as online videos

List of Experiments:

1. To determine of Resistivity and band Gap of Semiconductor by Four probe method at different temperature.
2. To measure Numerical aperture of a given optical fiber using optical fiber kit.
3. To observe various types of losses occurs in optical fibre using fibre kit.
4. To determine the wavelength of laser light with a diffraction grating.
5. To construct basic gates using PN junction diode.
6. To find out the Fill Factor of a given solar cell.
7. To verify Boolean Algebra and Demorgan's Theorem
8. To study the variation of Hall Voltage with probe current at constant magnetic field.
9. To study the variation of Hall Voltage with magnetic field at constant probe current.
10. To obtain hysteresis curve (B.H Curve) for a given ferromagnetic material (Thinrods) on a DSO using solenoid and then to determine the related magnetic constant from it.
11. To Measure the voltage and current of the solar cells in series and parallelcombinations.
12. To determine the volume magnetic susceptibility of Manganese sulphate solution at different concentrations.