Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Bachelor of Technology (B. Tech)
Course Code	:	2BEP01
Course Title	:	Engineering Physics
Type of Course	:	Basic Science (BS)
Year of Introduction	:	2023-24

Prerequisite	:	To study this course, students should have knowledge of high school Physics and Mathematics which includes basic scientific principles, algebra and trigonometry.
Course Objective	:	Students able to assess and contribute to the solution of the technical and engineering problems that are based on broad principles of Physics.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	The student will gain knowledge of theoretical and mathematical concepts associated with elastic properties of matter.
	CO2	The student will demonstrate understanding the basic principles, properties and applications of associated with Waves, Motion and principles, properties and production technique of Ultrasonic sound and its applications in NDT.
	CO3	The student will demonstrate understanding of basic theory, properties and applications of Superconductivity
	CO4	The student will demonstrate understanding of basic principles, properties, type and application Lasers.
	CO5	The student will demonstrate understanding of basic principles, properties and applications associated with semiconducting materials.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
3	0	2	4	70	30	30	20	150

*Legends: **L**-Lecture; **T**–Tutorial/Teacher Guided Theory Practice; **P**– Practical,**C** – Credit, **SEE** – Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with CO
1	**Elastic properties of matter:** Concept of load, stress and strain, Hook's law, Different modulus of Elasticity Stress-Strain diagram, Ductility, Brittleness and Plasticity, Working stress and Factor of safety, Twisting couple on a cylinder or wire-shaft, Cantilever depression and it's Young's modulus	7	19%	CO1
2	**Wave motion & Ultrasonics:** Simple harmonic motion, Damped and undamped vibrations, Damped harmonic motion, Wave motion, Transverse and longitudinal vibration, Sabine's Formula, Acoustic of building. Ultrasonic waves, Properties of ultrasound, Piezoelectric and magnetostriction method, Detection and application of ultrasound, Introduction to NDT.	9	25%	CO2
3	**Superconductivity:** Introduction, Properties of superconductivity: Effect of magnetic field, Meissner effect, Pressure effect, Impurity effect, Isotopic mass effect, BCS theory, Penetration depth: Magnetic field, Josephson's junction and its application, Application of superconductor in Engineering.	7	20%	CO3
4	**Lasers:** Properties of laser: Absorption, Spontaneous - emission, Stimulated emission, Einstein's co-efficient, Population inversion, He-Ne laser, Ruby laser, Properties of laser beam, Applications of lasers in science, engineering and medicine.	6	16%	CO4
5	**Semiconductors:** Intrinsic and extrinsic semiconductors, Dependence of fermi level on carrier concentration and temperature, Carrier generation, Carrier transport: Diffusion and drift, P-N junction, Metal semiconductor junction, Semiconductor materials of interest for optoelectronics devices.	7	20%	CO5

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**30**	**40**	**30**	**0**	**0**	**0**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	To study the I-V characteristics of Zenor diode.	02
2	To study the I-V characteristics of LED.	02
3	To draw the characteristic curve of a junction diode in forward and reverse bias condition.	02
4	To measure the band gap of Ge crystal by using PN junction diode.	02
5	To determine the giver solar cell.	02
6	To determine the velocity of ultrasonic waves in a non-electrolytic liquid by ultrasonic.	02
7	To determine the compressibility of a non-electrolytic liquid by ultrasonic.	02
8	To determine the wavelength of given laser source.	02
9	To measure the numerical aperture of an optical fiber.	02
10	To study of Cathode Ray Oscilloscope.	02

Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Zener Diode kit, Patch cords
2	Experimental trainer kit, D.C. Voltmeter, D.C. milliammeter, connecting wires
3	Patch codes, diodes, Digital multimeter, milliammeter, microammeter, potentiometer, Regulated power supply, Bread board
4	D.C. Power supply, Diodes, Switch, LCD display, Oven, Coil, Fuse, Mains, Patch codes
5	Solar panel, Power supply, Voltmeter, Ammeter, Potentiometer, Rechargeable Ni-Cd Battery, Bulb, Fan, Band radio
6	Quartz crystal(20mm:1.4mm, 2 MHz), Liquid cell(12cc, 25mm:0.01mm), Ultrasonic Transducer, Clock generator, Amplifier, threshold detector, Buzzer Indicators, Power supply & Fuse
7	Quartz crystal(20mm:1.4mm, 2 MHz), Liquid cell(12cc, 25mm:0.01mm), Ultrasonic Transducer, Clock generator, Amplifier, threshold detector, Buzzer Indicators, Power supply & Fuse
8	He-Ne Laser, Transmission diffraction grating, Meter scale
9	Transmitter, Receiver, Fiber optic plastic cable, Fiber optic glass cable, Main cords, NA measuring Jig, NA measuring Scale, Mandrel
10	Cathode Ray Oscilloscope, Multimeter & Oscillators

Suggested Learning Websites

Sr. No.	Name of Website
1	https://www.williamson-labs.com
2	https://www.nptel.ac.in
3	https://www.olabs.edu.in
4	https://www.vlabs.iitb.ac.in
5	https://www.khanacademy.com
6	https://www.sciencing.com
7	https://www.compadre.org/student
8	https://www.compadre.org/osp
9	https://www.datasheetcafe.com
10	https://www.vlab.co.in

Reference Books

Sr. No.	Name of Reference Books
1	Engineering physics by Dr. M.N Avadhanulu, Prof. H.B. Patel, S.Chand & company.
2	Principles of Physics by Jearl Walker, Wiley India Pvt. Ltd.
3	Engineering Physics by K. Rajagopala, PHI Learning private limited.
4	Engineering Physics by Jigar H. Shah, Jay M. Joshi, Nirali H. Gondaliya.
5	University Physics with modern Physics by Huge D. Young & Roger A. Freedman.
6	Engineering Physics by Dattu R Joshi, McGraw hill Publications
7	Engineering Physics by Shatendra Sharma & Jyotsan Sharma, Pearson Publication
8	Mechanics of Materials, SI Edition, 9th Edition,Barry J. Goodno, James M. Gere
9	S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
10	J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc