Subject Code: 01GS0101
Subject Name: Physics
B. Tech. Year- I (Semester - 1)

Type of course: Basic Science

Prerequisite: Basic understanding of Math's, Physics and chemistry

Rationale: The basic science physics program is to prepare students for careers in engineering where physics principles can be applied to the advancement of technology. This education at the intersection of engineering and physics will enable students to seek employment in engineering upon graduation while, at the same time, provide a firm foundation for the pursuit of graduate studies in engineering.

Course Outcome:

After completion of this course, student will be able to

1. Recognize importance of physical concepts and its day to day applications.
2. Interpret the role of dielectric, magnetic and advanced engineering materials and their behaviors under various system conditions.
3. Describe qualitative comparison between various diodes.
4. Explain the need of NDT and its methodologies

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					
				Theory Marks			Practical Marks		Total Marks
THEORY	TUTORIAL	PRACTICAL	C	ESE(E)	IA	CSE	Viva (V)	Term Work (TW)	
3	0	2	4	50	30	20	25	25	150

Content:

Sr. No.	Content	Total Hrs.
1	**Acoustics:** Introduction of musical sound and noise, Audible sound, Characteristics of audible sound, Loudness and Weber-Fechner law, Introduction of sound absorption co-efficient, Sabine's formula for reverberation (Without Derivations), Factors affecting the acoustics of building and their remedies, Sound absorbing materials, Sound Insulation, Noise Pollution, Noise Controling machineries.	05

2	**Ultrasonic:** Ultrasonic sound, Piezo-electric effect and Piezo-electric generator, Magneto-striction effect and Magneto-striction generator, Measurement of ultrasonic sound by Debye-Sear method, Applications of ultrasound in various disciplines.	**04**
3	**Non Destructive Testing:** Visual inspection: Scope and advantages of NDT, comparison of NDT with DT, Classification of NDT, equipments used for visual inspection, magnifying glass and mirror, microscope, bore scope, endoscope, video image scope. Eddy current testing: principle, advantages and disadvantages, factors affecting eddy current response, limitations and types of probes. Liquid penetrant testing: introduction, principle, equipments, procedures, limitations. Radiographic testing: X-ray and gamma ray radiography, principle, equipments and methodology, radiographic exposure factors, image quality, limitations and radiation hazards.	**05**
4	**Optical Fibre**: Introduction of Optical Fiber, Structure and advantages of Optical Fiber, Total Internal Reflection, Derivation of Numerical Aperture and Acceptance angle, Modes of Propagation, Classification of Optical Fiber, Fiber loss, Fiber optic communication system, Applications of optical fiber.	**04**
5	**LASER**: Properties of LASER, Spontaneous and stimulated emission, LASER with basic idea about Population Inversion, Pumping mechanism, Optical Resonators, Nd: YAG LASER, principle, construction and working, Applications of LASER in various disciplines, Principle of holography and its applications.	**04**
6	**Superconductivity**: General Properties of superconductors, Types of Superconductors, High Temperature superconductors, Applications: Magnets, Josephson effect, SQUID, Maglev, other	**04**
7	**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.	**05**
8	**Nano-Physics**: Introduction of Nano scale, Surface to volume ratio, Synthesis of Nano materials: Top-down; Ball milling, lithography, erosion, Bottom-up; PVD,CVD, PECVD, and sol-gel methods, Structure and types of Carbon Nano tube, Synthesis of CNT; Electrical arc method, CVD, Laser ablation, Properties and applications of CNT, Properties and applications of Nano materials.	**05**
9	**Advanced Engineering Materials**: Metallic glass: Introduction, Synthesis; splat cooling and Melt spinning methods, Properties and Applications, Shape Memory Alloy: Introduction, Properties and Applications, Energy materials: Hydrogen fuel cell	**04**

Distribution of Theory Marks

R Level	**U** Level	**A** Level	**N** Level	**E`** Level	**C** Level

20	**30**	**25**	**15**	**10**	**--**

Legends: R: Remember**; U:** Understand**; A:** Apply**; N:** Analyze**; E:** Evaluate**; C**: Create

List of Experiments:

1. To verify I-V characteristics of PN diode
2. To verify I-V characteristics of Zener diode
3. To verify I-V characteristics of Light Emitting diode
4. To determine efficiency of solar cell
5. Study of solar cell in series and parallel combinations
6. To determine Numerical Aperture of Optical Fiber
7. To determine propagation and bending losses of Optical Fiber
8. To determine velocity of ultrasonic sound in water by ultrasonic interferometer
9. To determine energy band gap of semiconductor by four probe method
10. To determine energy band gap of semiconductor by resistivity-temperature method
11. To determine carrier concentration of a given semiconductor by Hall effect
12. To determine divergence of LASER beam

Reference books:

1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc.
2. (1995).
3. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
4. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
   Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford
5. University Press, New York (2007).
6. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
7. Engineering Physics by Dattu R Joshi, McGraw hill Publications.

List of Open Base Software / learning website:

1. http://nptel.ac.in/courses
2. http://nptel.ac.in/downloads
3. http://vlab.amrita.edu/index.php