FACULTY OF ENGINEERING & TECHNOLOGY

First Year Bachelor of Engineering

Course Code: 102001213

Course Title: Physics

Type of Course: Basic Science Course

Course Objectives: The basic science physics course is to prepare students for implementing physics principles to the advancement of technology. The course aims to provide a stable foundation for the pursuit of graduate studies in engineering as well as to enhance their scientific thinking abilities towards the real life problems in various engineering branches.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Internal		External		Total
Lecture	Tutorial	Practical		Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	30 / 9	20 / 6	70 / 21	30 / 9	150 / 45

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Unit 1 Sound Acoustics: Sound waves in air, Properties and characteristics of sound wave, Doppler effect, Sound absorption and reverberation, Sabine's formula and usage (excluding derivation), Acoustic of building Ultrasonics: Properties of ultrasound, Production of ultrasonic waves, Magnetostriction, Piezoelectric method, Piezo-electric oscillator, Acoustical Grating method, Application of ultrasound, Non Destructive testing	10
2	Unit 2 Band theory of Solids Introduction, Formation of bands and energy gap- A quantum Mechanical Approach, Kronig –Penny Model and E- K Diagram, Energy band Formation, Fermi Dirac Distribution Function and Fermi level, Classification of Solids : conductors, semiconductors and insulators, Concept of Effective mass	10
3	Unit 3 Superconductivity Introduction of Superconductivity, Properties of superconductor, Effect of magnetic field, Meissner effect, Isotopic mass effect, Type I And Type II Superconductors, Application of superconductors: MagLav, Cryotron and SQUID	5
4	Unit 4 Nonlinear Optics Lasers: Properties of Laser, Einstein's theory of matter radiation : A and B coefficients, Different types of lasers, He-Ne laser, Applications of lasers in science, engineering Fiber Optics: Introduction, Construction of optical fiber cable, Total Internal Reflection, Equation of Numerical Aperture, Classification, Advantages, Apllication	10

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5	Unit 5 Measurement Techniques Introduction, Four-probe Technique, Van der Pauw Technique, Hall Effect Measurement, UV-Vis Spectroscopy, Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM)	**6**
6	Unit 6 Engineering Materials Nanomaterials: Introduction, Concept, properties, Synthesis of Nanomaterials by Physical vapor transport method, Applications with concept of quantum computing Shape Memory Alloy: Structure, properties and applications Metallic glasses: Properties, Melt Spinning Technique, Applications Bio Materials: Properties and Applications	**7**

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						**R**: Remembering; **U**: Understanding; **A**: Application, **N**: Analyze; **E**: Evaluate; **C**: Create
R	**U**	**A**	**N**	**E**	**C**	
10%	30%	25%	20%	10%	5%	

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

Reference Books:

1	Engineering Physics by Dattu R Joshi, Tata MC Graw Hill education Private Limited, 2010
2	Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson India Education services Pvt.Ltd, 2018
3	A Textbook of Engineering Physics by M. N. Avadhanulu, And P. G. Kshirsagar, S. Chand and Company, 2011
4	Engineering Physics by V Rajendran, Tata McGraw Hill Education Private Limited, 2010

Course Outcomes (CO):

Sr.	**Course Outcome Statements**	**%weightage**
CO-1	The student will demonstrate the ability to think in core concept of their engineering application by studying various topics involved in branch specific applications.	**55**
CO-2	The student will demonstrate the ability to use appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in physics.	**20**
CO-3	In courses involving laboratory, the student will demonstrate the ability to collect and analyze data and to prepare coherent reports of his or her findings He/ She will learn to create visualization of various phenomena covered in the syllabus and to induce the skill of student in handling different measuring instruments.	**10**
CO-4	In a design module project, the student will demonstrate the ability to perform a literature search, to make use of appropriate computational or laboratory skills, and to make an effective written or oral presentation of the results of the project.55	**15**

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List of Practicals / Tutorials:

1	(a) To study Vernier calipers and micrometer screw gauge. (b) To study spherometer.
2	(a) To analyze the errors in the experiment of Vernier calipers, micrometer screw gauge and spherometer. (b) To measure the velocity of ultrasonic waves in liquid and calculate the compressibility and bulk modulus of liquid.
3	(a) To determine Young's modulus of elasticity of the given sample material by bending of beam method. (b) To study the series and parallel combination of solar cells.
4	(a) To study the current–voltage characteristic and the power curve to find the maximum power point (MPP) and efficiency of a solar cell. (b) To measure numerical aperture of optical fiber cable. To Study Bending loss and measurement of propagation loss or Attenuation loss in fiber optic cable.
5	(a) To study Full Wave Bridge Rectifier. (b) To study and verify R-L-C Series circuit.
6	(a) To measure dielectric constant of different materials. (b) To study the coercivity, saturation magnetization and retentivity of the given material (commercial Nickel).
7	(a) To determine the wavelength of laser using grating and to determine the slit width. (b) To study Hall effect and its applications.
8	(a) To study seven-segment LED display. (b) Determination of resistivity and band gap of semiconductors by four probe method at different temperatures.
9	To study basic electrical instruments (CRO) and Measurement of Frequency and Voltage using CRO and Function generator.
10	(a) To study the characteristics of p-n junction diode. (b) To study Zener diode characteristics.
11	(a) To study the characteristics of light emitting diode (LED). (b) To determine the radius of curvature of a given plano-convex lens by setting up Newton's rings.
12	Set up for Study of Damped Simple Harmonic Motion
13	Set up of Melde's Experiment Transverse and Longitudinal Modes.
14	Experiments With Sonometer
15	To Determine the Minimum Deviation angle using Spectrometer

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Supplementary learning Material:	
1	How things works by Louis A Bloomfeild, Wiley Publications
2	Physics of Everyday Phenomena by W. Thomas Griffith, Juliet Brosing, McGraw Hill Education
3	Physics (Par I and II) by R Resnik and D Halliday, Wiley Publications
4	Concepts of Physics by H C Verma, Bharati Bhawan Publishers & Distributors

Curriculum Revision:	
Version:	**1**
Drafted on (Month-Year):	Apr-20
Last Reviewed on (Month-Year):	Jul-20
Next Review on (Month-Year):	Apr-22

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