Engineering Physics (PH102) course will be common for all branches of SoE (CE, EE, ME), and SoICT (CS, EC), and will remain same as approved previously. Bio-Technology/Food Technology students will have common Physics course, namely **Applied Physics (PH-101). Engineering Physics Laboratory (PH104)** course will be common for all branches of SoE, SoICT, SoBT and SoVSAS. The changes will be effective from Session 2014-2015.

PH101-APPLIED PHYSICS

(Food/Bio Technology)

4-Credits (3-1-0)

Module I-Optics: Sinusoidal wave propagation: One dimensional wave equation, Light as Electromagnetic wave, Superposition of waves: Interference of light, Coherent sources, Division of wavefront: Young's fringes, Fresnel's bi-prism; Division of amplitude: Uniform thin films, Newton's rings; Diffraction of light: Types, Fraunhofer diffraction of Single and double slits; Diffraction grating and resolving power; Polarization of light, Malus' and Brewster's laws, Concept of double refraction, Nicol prism, Quarter and half wave plates, Production of circularly and elliptically polarized light, Rotatory polarization, Optical Activity, Polarimeters.

Module II: Application of Optics: Optical imaging devices, Holographic principles: Recording and reconstruction of holograms; Lasers: spontaneous and stimulated emissions, main components of laser, three level laser system; Optical fibers: Total internal reflection, numerical aperture, Attenuation, optical fiber sensors and their applications.

Module III-Quantum Theory Fundamentals: Particle nature of waves: Photo-electric and Compton effect, Wave nature of particles: De-Broglie waves; Davisson-Germer Experiment; Wave-packet, Heisenberg's Uncertainty principle; wave-function and its physical interpretation; Schrodinger wave equation; particle in a box (One dimensional), Concept of tunneling effect.

Module IV-Solid state physics: Bonding in solids, Lattice and crystal structures, Band theory of solids: classification, Solid State Devices.

V-Nanotechnology: Properties of nanoparticles; carbon nanotubes (CNT); Applications of nanotechnology in Bio and Food Science, Measurement Techniques: X-Ray Diffraction (XRD), Spectroscopy, Scanning electron microscope (SEM), Atomic force microscope (AFM).

Texts/References

1. Ajoy Ghatak, Optics, Tata McGraw Hill Eduacation Pvt. Ltd., (2009)
2. Arthur Beiser, Concepts of Modern Physics, Tata McGraw-Hill Education Pvt Ltd., (2006)
3. K. K. Chattopadhyay & A. N. Banerjee, Introduction to Nanoscience and Nanotechnology, PHI Learning Pvt Ltd. (2009)

PH104-ENGINEERING PHYSICS LABORATRY

~~1.5 Credit (0-0-3)~~ 1 Credit (0-0-2) [signature]

List of Experiments *

1. Measurement of basic constants: Length, Weight & Time.
2. Study of current balance/ force acting on a current carrying conductor.
3. To study the magnetic field variation of paired coils in a Helmholtz arrangement
4. To study Interference due to division of wavefront with double and multiple slits
5. To study Fraunhofer diffraction of light using a single slit and circular hole.
6. To study the interference of light by Fresnel's Biprism and find the fringe width.
7. To determine the Cauchy' constant using Prism and spectrometer
8. To find wavelengths of Mercury light source using Plane Transmission Diffraction Grating
9. To study the Polarization of light and verify Malus's Law
10. Study of Photoelectric effect and calculate the Planck's Constant
11. To determine the wavelength of light by Newton's Rings.
12. To determine the energy band gap of a given semiconductor material using Four-Probe method.
13. To find the e/m of electron by Thomson's method.
14. To study the characteristics of Solar Cell.
15. To calculate the wavelength of sodium light using Fresnel's biprism.
16. To determine specific rotation of sugar using half shade polarimeter.
17. To study the Coupled Pendulum
18. Study of Electron Diffraction (Dual Nature of Electron)
19. To study Faraday's law of Induction
20. To study the B-H curve of magnetic materials
21. To study the concept of quantization of energy levels by using Franck-Hertz experiment

Note: The courses not mentioned here will remain same as approved previously.

* Students will perform 8-10 experiments from the list of experiments. [signature]

[signatures]

26/7

26/9/18

26/9/18

Engineering Physics [PH102]

L-T-P: 3-1-0 **Credits: 04**

Module I: Electromagnetic (EM) theory

Vector algebra and co-ordinate systems, Gauss' law, Stokes' theorem, Maxwell's equations: EM wave equations in differential and integral forms, transverse nature and speed of EM waves, EM energy density, Poynting vector.

Module II: Interference

Coherent sources, Conditions for interference; Division of wavefront: Young's double-slit experiment, Fresnel's bi-prism**;** Newton's rings method; Division of amplitude: Unifrom and wedge-shaped films; Michelson's interferometer.

Module III: Diffraction

Difference between interference and diffraction; Fresnel and Fraunhofer diffractions; Fraunhofer diffraction by single slit and double slit; Resolving power of prism and grating.

Module IV: Polarization

Unpolarized, partially; and completely polarized lights; Polarization by reflection; Double refraction by uni-axial crystals; Polariods; Half wave and full wave plates.

Module V: Relativity

Special theory of relativity; Length contraction and time dilation; Twin paradox; Doppler's effect; Mass and energy equivalence; Massless particles.

Module VI: Quantum theory of EM waves

Photo-electric effect: The origin of Quantum theory of light, X-rays, X-ray diffraction (Bragg's law) and applications, Compton Effect; Dual nature of light; De-Broglie waves; Davisson-Germer Experiment; Phase and group velocities; Uncertainty principle;

Quantum mechanical wave-function; Schrodinger wave equation; Boundary conditions; particle in a box; Tunnel effect (finite potential well).

Module VII: Solid state physics

Brief discussion of solids, crystals, and bonds; Band theory of solids; Semiconductor devices.

Module VIII: Nanotechnology

Properties of nanoparticles; carbon nanotubes; applications; SEM and AFM techniques.

Texts/References:

1. D. J. Griffiths, Introduction to Electrodynamics, PHI Learning Pvt Ltd.
2. H. K. Malik & A. K. Singh, Engineering Physics, Tata McGraw Hill Education Pvt Ltd.
3. Arthur Beiser, Concepts of Modern Physics, Tata McGraw-Hill Edition.
4. K. K. Chattopadhyay & A. N. Banerjee, Introduction to Nanoscience and Nanotechnology, PHI Learning Pvt Ltd.