PHYSICS

BEG103SH

Year: I **Semester: I**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
4	2	1	3	80	3	25	20	-	125	

Course objective: To provide the concept and knowledge of physics with the emphasis of present day application. The background of physics corresponding to proficiency certificate level /+2 science is assumed.

Course Details:

1. Simple Harmonic Motion. (4 Hrs)

1.1 Introduction ,Hook's law ,elastic restoring force ,equation of S H M (2 hrs)
1.2 Examples of SHM; Suspended mass spring system pendulum (bar pendulum) (1 hrs)
1.3 Angular harmonic motion: Torsional pendulum. (1 hrs)

2. Waves in elastic media (5 Hrs)

2.1 Introduction to waves, types of wave; travelling wave, mechanical wave, speed of traveling wave in a stretched string, waves and particles. (2 hrs)
2.2 Energy and power in travelling waves, Intensity in wave motion. (1 hrs)
2.3 Reflection of waves, Principle of superposition, interference of waves. (1 hrs)
2.4 Standing waves and resonance (1 hrs)

3. Acoustics (7 Hrs)

3.1 Sound waves, Sound propogation in gases, liquids and solids, pressure variation due to waves. (1½hrs)
3.2 Attenuation, reflection and refraction (½hrs)
3.3 Beat phenomena and Doppler's effect. (1½hrs)
3.4 Energy considerations, intensity level and loudness. (1 hrs)
3.5 Ultrasound and its uses, production of ultrasound (Introduction) distances measurement, imaging, signaling, cleaning, and neating. (2½hrs)

4. Electrostatics (7 Hrs)

4.1 Electric charge, Interaction between electric charges. (½hrs)
4.2 Electric field, lines of force, calculation of electric field due to dipole and quadrupole, electric flux (1hrs)
4.3 Gauss law, Application of Gauss Law to spherical, linear and planer symmetric distribution of charges. (2hrs)
4.4 Electric potential, potential difference, potential due to a point charge, potential gradient (½hrs)
4.5 Potential due, to dipole and quadrupole, electrostatic potential energy. (½hrs)
4.6 Capacitors; parallel plate capacitor, spherical capacitor, permittivity, conductors and dielectric in electric field, E and D fields, energy stored in electric field and energy density. (2hrs)
4.7 Electrostatic induction, lightning conductors, industrial uses and hazards. (½hrs)

5. Direct Current (5 Hrs)

5.1 Current flow in solids, liquids and gases. Ohm's law, Resistance in series and parallel. (½hrs)
5.2 Current and current density, atomic view of resistivity, effect of temperature on resistance. (1hrs)

5.3 Semiconductors: Intrinsic and extrinsic semiconductor, Introduction of PN Junction, NPN&PNP transistor (2hrs)
5.4 Energy loss, heat production, verification of joule's law. (1hrs)
5.5 Kirchhoff's law. (½hrs)

6. Magnetism and magnetic fields. **(10 Hrs)**

6.1 Sources of magnetic fields: current and permanent magnets, earth's magnetic field, lines of force flux of magnetic field and permeability. (1 hrs)
6.2 Biot and Savart's law and its application to long straight conductor carrying current, Amperes theorem and its application to long straight conductor carrying current and solenoid carrying current. (2 hrs)
6.3 Magnetic scalar potential and potential gradiant (1 hrs)
6.4 Force on conductor in magnetic fields, force per unit length between parallel conductors carrying current. (1 hrs)
6.5 Faraday's law of electromagnetic induction, flux linkage, Lenz's law, self induction, calculation of the coefficient of self- induction for solenoid (2 hrs)
6.6 LR circuit, Energy stored in magnetic field, Energy density of magnetic field. (1 hrs)
6.7 Magnetic properties of matter, Domain Theory, Ferromagnetism, Saturation and Hysteresis. (2 hrs)

7. Electromagnetic Oscillations. **(4 Hrs)**

7.1. LC oscillation , analogy to SHM (1hrs)
7.2 Electromagnetic oscillation (quantitative) forced oscillation and resonance, Induced magnetic field. (2hrs)
7.3. Displacement current and its applications. (1hrs)

8 Electromagnetic waves. **(4 Hrs)**

8.1. Maxwell's equation –Differential and Integral form. (2hrs)
8.2. Application of Maxwell's equation, wave equations in free space and medium.(1hrs)
8.3. Speed of electromagnetic wave. Energy of electromagnetic wave, Pointing vector (1hrs)

9. Optics

9.1 Geometrical Optics **(6 Hrs)**

9.1.1 Nature and source of light, different theories of light, different types of sources. (1hrs)
9.1.2 Review of optics of mirror and lenses, reflection and refraction both in plane and spherical surfaces, refraction through prism. (1hrs)
9.1.3 Combination of lenses in contact and at a separation, cardinal points, Achromatic combination of two lenses, separated by distance (1 hrs)
9.1.4 Monochromatic aberration of lenses, spherical aberration, astigmatism, coma, curvature of field and distortion, causes and their minimization (1hrs)
9.1.5 Fibre optics: Introduction to optical fibre, Types of optical fibres, Uses in communication. (1hrs)
9.1.6 Lasers: Principal of the generation of laser light, Uses of Laser. (1hrs)

9.2 Physical Optics **(8 Hrs)**

9.2.1 Interference: Interference of light waves, Young's experiment, coherent sources, path difference and phase difference, condition for constructive and destructive interference, interference in thin films and wedge shape, Newton's ring and determination of wave length, blooming of lenses. (3 hrs)
9.2.2 Diffraction: Introduction of Fresnel's and Fraunhoffer diffraction for a single and double slits and multiple slits. Diffraction grating, intensity variation in order, wave length measurement by diffraction gratings. (2 hrs)

9.2.3 Polarization: Introduction ,Polarization by reflection, Malu's law, double refraction, Nicol prism, plane, circular, elliptical polarization of light waves, Optical activity, polarimeter (2 hrs)

9.2.4 Use of light, distance measurement, signal transmission, optical stress analysis, spectrometric analysis of gases. (1hrs)

Laboratory : (Minimum 9 Experiments)

1. Physical pendulum, Torsional pendulum
2. Resonance tube
3. Newton's Ring, Diffraction grating, prism
4. Carryfoster bridge, Low resistance, resistivity, LC circuits.
5. Polarimeter, Junction transistor

Reference Books:

1. Physics by Resnick, Haliday 2nd/ 4th Edition
2. Concept of Modern Engineering Physics by A. S. Vasudeva
3. Optics by Subrhramanyam and Brij Lal
4. Practical Physics by C. L. Arora.