



SYLLABUS

Course Title	PHYSICS-IV	
Course Code	BPH 401	
Course Credit	Lecture	: 04
	Tutorial	: 00
	Practical	: 03
	Total	: 07
Detailed Syllabus:		
Sr. No	Name of chapter & Details	Session Allotted
SECTION-I		
1	Diffraction: Introduction, Two types of Diffraction, Fresnel's Explanation of the Rectilinear propagation of light (up to equation, Zone Plate, Action of Zone Plate, Comparison between Zone plate & convex lens, Fraunhofer diffraction at Double Slit (Geometry Method), Plane diffraction grating, Theory of grating, Determination of wavelength, Prism & Grating Spectra.	8
2	Lasers: Interaction of Radiation with matter (Spontaneous and stimulated emission), Einstein's Relations, Light amplification & conditions, Population Inversion, Pumping, Metastable states, The principle pumping schemes, Optical Resonance, Types of Lasers Nd:YAG Laser, CO ₂ Laser, Ruby Laser, He-Ne Laser, Semiconductor Laser, Applications	7
3	Fiber Optics: Optical Fibers, Critical angle of Propagation, Modes of propagation, Acceptance angle, Fractional refractive index change, Numerical Aperture, Types of Optical Fibers, Applications, Military Applications, Optical fiber Sensors, Medical Applications, Fiber optic communication, Advantage.	7
4	Oscillators: Sinusoidal oscillators, Positive feedback, Barkhausen Criterion, Different types of transistor oscillators, Colpitt's Oscillator, Hartley Oscillator, Phase Shift Oscillator, Wein Bridge Oscillator.	6
SECTION-II		

5	Modulation and Demodulation: Radio broadcasting, transmission & reception, Modulation, Types of Modulation, Amplitude Modulation, Transistor AM Modulator, Limitations of Amplitude Modulation, Frequency Modulation, Demodulation, Essentials of demodulation, AM diode detector, Types of AM radio receivers.	8
6	Solid State Devices: Types of Field Effect Transistors, Junction Field Effect Transistors, Working principle of JFET, Symbol, Importance of JFET, Difference between JFET & Bipolar Transistor, Output Characteristics of JFET, Advantages of JFET, Parameters of JFET(only definition), MOSFET, Unijunction Transistor, Equivalent circuit of UJT, Characteristics of UJT, Advantages & Applications of UJT, Thermistor	8
7	Digital Electronics: Analog and Digital Signal, Binary number system, Logic gates, OR gate AND gate, NOT gate, Combination of basic logic gates, NAND gate as universal gate, Encoders and Decoders, Advantages and disadvantages of Digital electronics, Boolean algebra, Boolean theorems, De Morgan's Theorems.	7
8	Optoelectronic Devices: Photo Transistor, LCD, Solar cell, Light Dependent Resistor, Light operated Relay, (a)Flame failure Relay, (b)Smoke Detector, (c)Twilight Switch, (d)Temperature Control Circuit	5

List of Practical (6 Hour/Week)

1. Determine the modulus of rigidity by Maxwell's needle.
2. Determine the modulus of rigidity by Statistical method.
3. Find the focal length & Refractive index of Convex lens by Optical lever.
4. Determination of I using mercury light by Diffraction gratings.
5. Resolving power of prism.
6. Resolving power of telescope.
7. Energy band gap of thermistor.
8. Study of Characteristics of Solar Cell.
9. Characteristics of Field Effect Transistor. Determination of m, R_d, G_m .
10. Characteristics of Uni Junction Transistor.
11. Verification of truth table of AND, OR, NOT, NAND & NOR gate.
12. NAND gate as Universal gate.
13. Study of Zener Diode as voltage regulating characteristics.
14. Study of Characteristics of Photo Transistor.
15. FET as Voltmeter.
16. e/m by Thomson's method.

Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Tutorials will be conducted.

- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Approximately ten experiments shall be there in the laboratory related to course contents.

Students Learning Outcomes:

At the end of the course the students will be able to:

- Understand basic concepts of diffraction, stimulated emission, optical communication, oscillator, modulation-demodulation, JFET, UJT, Thermistor and optoelectronic devices.
- Apply the concept of diffraction, optical sensors, logic gates, solar cell and relay circuit.
- Perform the practical of rigidity, diffraction, solar cell, FET, UJT, logic gates and photo transistor.
- Conclude the results of logic gates.
- Compare the results of different sensing devices.

Reference Books:

1. A Text Book of Optics N.Subrahmanyam, BrijLal&M.N.Avadhanulu, S.Chand& Co.
2. Engineering Physics by R.K.Gaur, S.L.Gupta, DhanpatRai Publications.
3. Principles of Electronics by V.K.Mehta&Rohit Mehta., S.Chand Company.
4. Modern Physics by R.Murugesan&KiruthigaSivaprasath, S.Chand Comp.
5. Waves and Oscillations by BrijLal and Subrahmaniam. S.Chand comp.