List of Revised Courses

Department : *Pure and Applied Physics*

Program Name : *B.Sc. (Physics)*

Academic Year : 2017-18

List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	**BP-301**	Heat and Thermodynamics
02.	**BP-302**	Basic Electronics
03.	**BP--303**	Lab-III
04.	**BP-401**	Optics
05.	**BP-402**	Modern Physics
06.	**BP--403**	Lab-IV

Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2017-18

School : *School of Physical Sciences*

Department : *Pure and Applied Physics*

Date and Time : *December 12, 2016 – 11:30 AM*

Venue : *Smart Class Room*

The scheduled meeting of member of Board of Studies (BoS) of Department of Pure and Applied Physics, School of Studies of Physical Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, was held to design and discuss the B. Sc. (Physics) Second year (III and IV Semesters), scheme and syllabi.

The following members were present in the meeting:

1. Dr. R. P. Prajapati
2. Dr. M. N. Tripathi
3. Dr. R. K. Pandey
4. Dr. Parijat Thakur
5. Dr. H. S. Tewari
6. Prof. D. P. Ojha
7. Prof. P. K. Bajpai

The committee discussed and approved the scheme and syllabi. The following courses were revised in the B. Sc. (Physics) Second year (III and IV Semesters):

- Heat and Thermodynamics (BP-301)
- Basic Electronics (BP-302)
- Lab – III (BP-303)
- Optics (BP-401)
- Modern Physics (BP-402)
- Lab-IV (BP-403)

Signature & Seal of HoD

Scheme and Syllabus

3rd Semester Physics

Paper VII (BP-301): Heat and Thermodynamics

Objectives: To learn how to apply thermodynamic principles in order to interpret thermodynamic systems and predict their behaviour. To be familiar with laws of thermodynamics.

Unit I: Definitions of thermodynamic terms, System, State variables, Equation of State, intrinsic and extrinsic parameters, heat, work, Internal energy, Thermodynamic processes, Concept of path, state and point functions, Zeroth law and first law of thermodynamics , Carnot's cycle and Carnot theorem,

Unit II: Concept of entropy, entropy and second law of thermodynamics, entropy and disorder, temperature – entropy diagram and its advantages, calculation of entropy changes for various thermodynamic processes.

Unit III: Thermodynamic variables and thermodynamic potentials, Maxwell general relations, Internal energy and TdS equations, Clausius Clapeyron relation, Joule – Kelvin effect and Joule – Kelvin effect for ideal gas and real gases, Joule-Thomson cooling and Porous plug experiment.

Unit IV: Transference of heat, Types of heat transport, Conduction, Convection and Radiation, Thermal conductivity, difference between thermal conductor and thermal insulator, Problems related to one dimensional heat flow: a long conducting rod and freezing of ponds.

Outcome: Understanding the thermodynamic system in nature. Law of thermodynamics concept of efficiency of heat engine and Carnot engine. Understanding different thermodynamic processes and explanation of various natural phenomena.

Text books:

1. Heat, Thermodynamics and statistical physics, by Brijlal, N. Subramanian and Hamne
2. Basic Thermodynamics by Guha
3. Heat & Thermodynamics by Sharma & Sarkar

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Paper VIII (BP-302): Basic Electronics

Objective: This course is designed to develop basic understanding of passive electronic components and their response under DC and AC signal using network theorems.

Unit I: Loop and Nodal analysis of d.c. and a.c. circuits (based on Kirchhoff Laws), Network theorems: Thevenin, Norton, and Maximum power transfer theorem.

Unit II: Fundamentals of semiconductors, P-N Junctions and junction Diode, junction breakdown, Zener Diode,

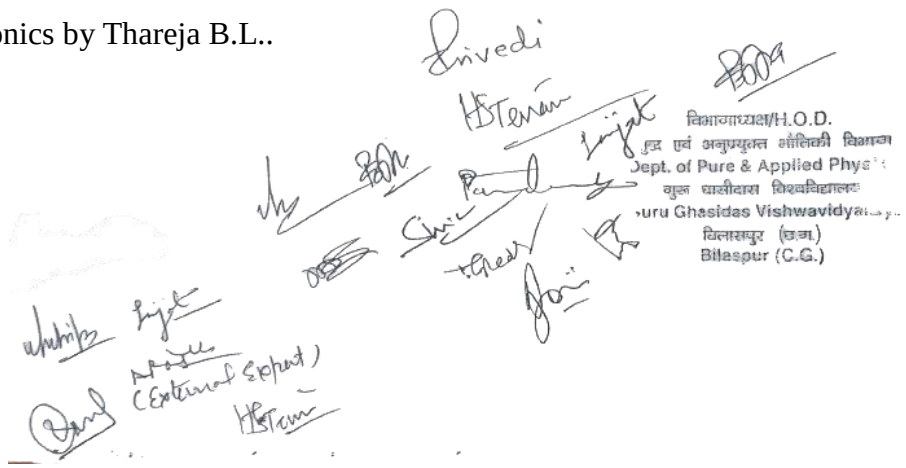
Unit III: Rectification; Half-Wave and full wave, and Regulation, Filters, Regulated Power Supply

Unit-IV: Basic ideas of bipolar devices, operation, different configuration and characteristics, Transistor h-parameters, Concept of d.c. and a.c. load lines, cut off saturation, BJT as amplifier

Outcomes: Understanding the passive electrical circuit elements such as resistances, capacitance and inductance, source of electrical energy, analysis of linear electrical circuit under DC and AC electrical signal.

References:

1. Principles of Electronics by Mehta V.K.
2. Elements of Electronics by Bagde and Singh S.P.
3. Basic Electronics by Thareja B.L..

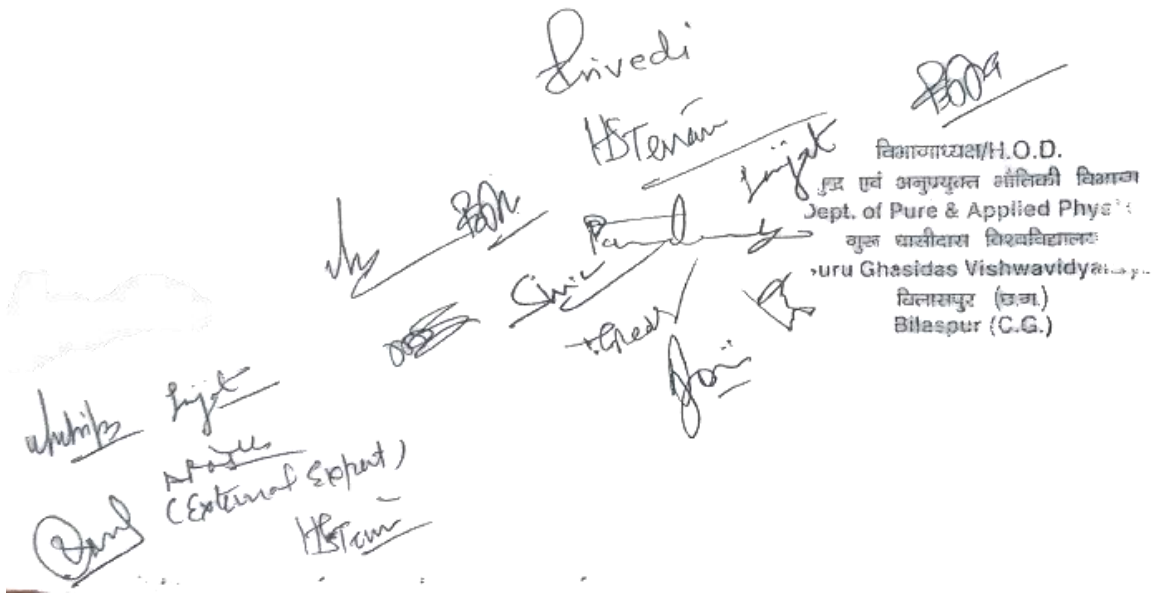


Paper IX (BP-303)
List of Experiments

Objective: This course is designed to develop basic understanding of passive electronic components and their response under DC and AC signal using network theorems.

1. Verify Thevenin's theorem (AC)
2. Verify maximum power transform theorem (AC)
3. Verify Norton's theorem (AC)
4. To study forward biased and reversed biased characteristics of p-n junction diode.
5. To study the characteristics of the Zener diode using bread board.
6. To determine the band gap of the semiconductor using bread board.
7. To find the coefficient of thermal conductivity by Searle's conductivity method.
8. To determine the coefficient of thermal conductivity of bad conductor by Lee's disc method
9. Callender and Barne's continuous flow method.
10. Linear expansion coefficient.
11. DC to AC source conversion.
12. (i) pnp transistor characteristics using bread board
    (ii) npn transistor characteristics using bread board

Outcomes: Understanding the passive electrical circuit elements such as resistances, capacitance and inductance, source of electrical energy, analysis of linear electrical circuit under DC and AC electrical signal.



Semester IV

Paper X (BP-401): Optics

Objective: The main objective of this subject is to aware the students about waves, types of waves and various phenomena of optics.

Unit I: Light and it's characteristics: Wave nature of light, Transverse waves, Sine waves,

Wave characteristics (phase angle, Phase velocity and Wave velocity, amplitude and intensity, Frequency and wavelength), Superposition of waves, Addition of simple harmonic motions along the same line, Vector addition of amplitudes, Superposition of two wave trains of same frequency.

Unit II: Interference: Interference of light waves, Classification in terms of division of

amplitude and division of wave front, Interference fringes from a double source, Young's double slit experiment, Intensity distribution in the fringe system, Fresnel's biprism, Displacement of fringes, Interference with white light, Phase change on reflection, Interference in thin parallel plane film and wedge-shaped film, Newton's ring.

Unit III: Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at Single slit, Fraunhofer diffraction by a circular aperture, Two slit Fraunhofer diffraction pattern, Position of maxima and minima, missing orders, N-slit Fraunhofer diffraction pattern, Principal maxima, minima and secondary maxima.

Unit IV: Polarization: Polarization of light waves, Plane Polarized, Circularly and elliptically polarized light, Polarization by reflection. Law of Malus, Superposition of two disturbances, Double refraction, Optic axis, Principle sections and Principle planes, Polarization by double refraction, Nicol Prism, Quarter and half wave plates.

Outcome: Understanding the physics behind various phenomena in waves and optics.

Text books:

1. Optics by Brijlal and Subramayam N.
2. Optics by Ajoy Ghatak
3. Fundamentals of Optics – Jenkins and White.
4. Optics by Eugene Hecht
5. Schaum's Outline of Optics

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(External Expert)

Paper XI (BP-402): Modern Physics

Objectives: To analyze the intensity variation of light in photoelectric effect and electron diffraction.

Unit I- The Special Theory of Relativity: Galilean Transformation, Michelson-Morley Experiment, Postulates of special theory of Relativity, Lorentz Transformation, Velocity Transformation, Length Contraction, time dilation and relativistic mass.

Unit II- Particle nature of radiation: Black body radiation, Planck's quantum hypothesis, Planck's radiation law, photoelectric effect, Compton effect.

Unit III- Lasers: Coherence time and coherence length, i.e. temporal and spatial coherence Spontaneous and stimulated emission, density of states, Einstein's A and B coefficients, Ratio of stimulated to spontaneous transitions in a system in thermal equilibrium. Energy density of radiation as a result of stimulated emission and absorption. Population inversion, Methods of optical pumping,

Unit IV- Description of He-Ne, Ruby lasers, Carbon dioxide laser.

Outcome: To provide the students with the ability to understand the duality in nature and to develop analytical ability of interference drawing.

Text books:

1. Concepts of Modern Physics by Beiser A.
2. Perspectives of Modern Physics by Beiser A.
3. Modern Physics by Richtmayer, Kennard and Cooper

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(External Expert)

Paper XII (BP-403)

Objectives: The main objectives of this lab is to demonstrate the types of waves and various phenomena of optics.

Experiments list

1. To determine the wavelength of sodium light with help of Fresnel's Biprism.

2. To determine the wavelength of sodium light by Newton's ring method.

3. To determine the wavelength of sodium light by diffraction grating.

4. To determine the thickness of thin wire by measuring the width of the interference fringes produced by a wedge shaped film.

5. To demonstrate the diffraction pattern and determine the wavelength of different colours of mercury lamp using diffraction grating.

6. To determine the wavelength and number of lines per cm on a diffraction grating using semiconductor laser diode.

7. To study the Fraunhofer diffraction occurring at a single slit & a circular aperture and to determine the width of the single slit & diameter of circular aperture using semiconductor laser diode.

8. To determine the value of Planck's constant by using a photoelectric cell.

9. To study the polarization of light by reflection and hence to determine the polarizing angle for air-glass interface.

10. To determine the value of Stefan's constant.

Outcome: To understand about waves, its propagation and superposition of waves.