CPH 301- Basic Physics-I

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 301	Basic Physics-I	3	48	30	70	100

COURSE CONTENT

Unit – I **Number of lectures: 12**
Weightage: 25%

- **Heat and Thermodynamics:**
  Characteristic functions, Enthalpy, The Helmolt'z and Gibb's function, Two Mathematical Theorems, Maxwell's equations, The T-ds equations, Energy equation, The Thermal Expansivity, Compressibility, Joule-Kelvin effect (Porous plug Experiment), Liquefaction of Gases by Joule-Kelvin effect.
- **Kinetic Theory of Gases:**
  Maxwell's Distribution Law of Velocities, Deduction of Maxwell – Boltzmann law , Determination of the values of constants 'a' and 'b', Experimental Test of Maxwell's Law.

Unit - II **Number of lectures: 12**
Weightage: 25%

- **Diffraction:**
  Distinction between Interference and diffraction, Fresnel and Fraunhoffer types of diffraction, Fraunhoffer diffraction at a double slit, Fraunhoffer

diffraction at double slit (Calculus method), Distinct between single slit and double slit diffraction pattern, Fraunhoffer diffraction at N slit, Plane diffraction grating, Theory of plane transmission grating, Dispersive power of Grating.

UNIT - III **Number of lectures: 12**
Weightage: 25%

- **Crystal Structure:**
  Crystalline and Amorphous Solids, Crystal Lattice and Crystal Structure, Translational Symmetry, Space, Unit Cell and Primitive Cell, Symmetry Elements in Crystals, The Seven crystal Systems, Coordination Number, Some importance crystal structure, Simple Cubic Structure, Body Centered Cubic Structure, Face Centered Cubic Structure, Wigner-Seitz Cells, Miller Indices, The spacing of a set of crystal planes.

- **Atomic Spectra:**
  Franck-Hertz experiment, Critical potentials, Shortcomings of Bohr's Theory, Summerfield extension of Bohr theory

UNIT - IV **Number of lectures: 12**
Weightage: 25%

- **Special theory of Relativity:**
  Newtonian Relativity, Michelson-Morley experiment, Special theory of relativity, Lorentz Transformation, Consequences of Lorentz Transformation -(a) Relativity of Simultaneity (b) the Lorentz-Fitz Gerald length Contraction (c) Time Dilation, Addition of Velocities, Mass-energy relation, Space time.

REFERENCES:

1. Heat and Thermodynamics by Mark W. Zeemansky (5th Edition)
2. Thermodynamics and Statistical Physics by Singhal- Agarwal-Prakash Pragti Prakashan, Meerut.
3. University Physics by Sears, Zeemansky and Young. (6th Edition) Narosa Publication, New Delhi.
4. Heat Thermodynamics and Statistical Physics by Brijlal, Dr. Subrahmanyam, P.S.Hemne S.Chand.
5. Waves and Oscillations by N Subramanyam, Brijlal.
6. A text book of OPTICS by Dr. N. Subrahmanyam, Brijlal, Dr. M. N. Avadhanulu - S.Chand

7. Introduction to Classical Mechanics by Takwale & Puranik Tata McGraw-Hill Publication (7th reprint-1986)
8. A Text book of Light by D.N.Vasudeva - S. Chand & Co.
9. Fundamentals of Optics by Jonkin's and White
10. Optics by Ajoy Ghatak
11. Principles of Optics by B.K. Mathur
12. Concept of Modern Physics by Besier McGraw–Hill
13. Elements of Special Relativity by S. P. Singh & M.K.Bagde S. Chand & Co. New Delhi.

14. Properties of Matter by Brijlal, N. Subrahmanyam, S.Chand.
15. Solid State Physics by Ajay Kumar Saxena (Macmillan India Limited)
16. Introduction to Solid State Physics by C. Kittle (John Willey)
17. Fundamental of Solid State Physics by Saxena, Gupta, Saxena (Pragati Prakashan)
18. Elements of Solid State Physics by J. P. Srivastava (PHI).
19. Atomic and Molecular Physics by Raj Kumar (Campus Books)

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	**Examination Scheme %Weightage**	**Teaching Scheme No. of Lecture**
Unit 1	25	12
Unit 2	25	12
Unit 3	25	12
Unit 4	25	12
Total	100	48

CPH 302- Basic Physics-II

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 302	Basic Physics-II	3	48	30	70	100

COURSE CONTENT

Number of lectures: 14
Weightage: 35%

Unit – I

- **Electrostatics in Dielectric:**
  Gaseous Non-Polar Dielectrics, Gaseous Polar Dielectrics, Non-Polar Liquids, Solid Dielectrics-Electrets.

- **Magnetostatics:**
  The Magnetic Potentials, Magnetic Vector Potential due to Small Current Loop, An alternative method for finding the Vector Potential A and the Field B due to Current Loop, Magnetization, Magnetic Field Vector, Magnetic Susceptibility and Permeability, Boundary Conditions, Uniformly Magnetized Sphere in External Magnetic Field, A Comparison of Static Electric and Magnetic Fields.

Unit - II **Number of lectures: 14**
Weightage: 35%

- **Transistors Biasing and Stabilization:**
  Bias Stabilization (Operating point stabilization), Stability factor , Stabilization by Collector Base Resistance, Stabilization by potential divider and Emitter resistor

- **Basic Transistor Amplifier:**
  Transistor as a four pole, h-parameters with h-parameters equivalent circuit (complete), Grounded Emitter Circuit - Mathematical analysis using h- parameters only, Comparative Study of three types of Amplifiers.

- **Solid state Devices:**
  JFET, UJT

UNIT - III **Number of lectures: 10**
Weightage: 15%

- **Fourier series:**
  Introduction, Periodic functions, Application of Fourier series, Average values of a function, Fourier Co-efficient, Diriclet's conditions, Complex form of Fourier series, Perseval Theorem.
- **Co-ordinate Transformation:**
  Curvilinear Coordinates, Scale factors and basis vectors for orthogonal systems

UNIT - IV **Number of lectures: 10**
Weightage: 15%

- **Schrodinger Equations:**
  A free particle in one dimension, Generalization to three dimensions, The operator correspondence and the Schrodinger equation for a particle subject to forces, Normalization and Probability Interpretation, Non-Normalizable Wave functions and Box Normalization.

REFERENCES:

1. Electromagnetics by B.B. Laud, New Age Int. Publisher (For Chapt. a & b)
2. Electricity and Magnetism by Maharajan and Rangwala, THM
3. Electricity and Magnetism Berkeley Physics course Vol.-II by EDWARD M PURCELL, McGraw Hill Pub.

4. Hand book of Electronics by Gupta & Kumar 30th Revised Edition, 2002 Pragati Prakashan

5. Electronics andRadio Engineering by M.L. Gupta (9th Edition-2002) D Raj & Sons. (For Ch-(C))
6. Electronic Devices and Circuits by A. Mottershead Prentice – Hall of India.
7. Integrated Electronics by Millman & Halkias
8. Basic Electronics and Linear Circuits by N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta
9. Mathematical method for physical sciences by M. L. Boss John Wiley Publication.
10. Quantum Mechanics by John L. Powell and Bernd Crasemann
11. A Textbook of Quantum Mechanics by P.M.Mathews and K.Venkatesan (TMH)
12. Atomic Physics by Rajan (S. Chand New Delhi)
13. Mathematical Physics by B.D.Gupta

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	**Examination Scheme %Weightage**	**Teaching Scheme No. of Lecture**
Unit 1	35	14
Unit 2	35	14
Unit 3	15	10
Unit 4	15	10
Total	100	48

PPH 301-Physics practical-III

RATIONALE: This course is designed to enable students to acquire on hand basic understanding of the physical phenomena, fundamental laws of physics, as well as on hand experience of handling the various instruments which have much use in industries as well as in research institutes. These experiments make the students capable and competent to work in physics related industries and research institutes

LEARNING OUTCOMES:

- Understand the basic principles and of physics.
- Develop an understanding about the handling of various instruments.
- Develop an analytical attitude for physical laws through simple and basic experiments.
- Gain knowledge and expertise in experimental physics field.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. General viva-voce will be conducted to analyse the knowledge of the student.

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PPH- 301	Physics Practical-III	3	7 (7 hrs & 1 Day)	100	100

LIST OF EXPERIMENTS

Laboratory Course-1: Non Circuitry Experiments

1. To find the viscosity of a fluid using coaxial viscometer.
2. To determine wave length of bright lines of mercury light using diffraction grating.
3. To measure the resolving power of Telescope.
4. To find the wavelength of light using an "A" Edser Diffraction Pattern.
5. Determination of 'y' using Kundt's tube.
6. To find Absolute Value of Capacitor using Ballistic Galvanometer (B.G.).
7. Determination of cardinal points and 'do' using Searl's Goneometer.

Laboratory Course-2: Circuitry Experiments

7. To find the ration of e/k using Power Transistor
8. To compare the Capacity of two capacitors (C1/C2) by De Sauty method.
9. To estimate the value of low Resistance by Projection Method for Electric Potential.
11. To determine self-inductance with the help of Anderson Bridge.
12. To study Common Base Transistor Characteristics (PNP).

13. To find the characteristics of JFET & Determination of μ, rd, gm
14. Construction of AND, OR, NOT Gates using NAND & NOR Universal gates.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.