About the College

Vivekanandha College of Arts and Sciences for Women (Autonomous) was established and hailed into Women's Educational Service in the Year 1995. Angammal Educational Trust Chaired by the great Educationalist 'Vidhya Rathna' Prof. Dr.M.KARUNANITHI, B.Pharm., M.S., Ph.D., D.Litt., sponsors this college and other institutions under the name of the great Saint Vivekanandha. Our institutions are situated on either side of Tiruchengode -Namakkal Main Road at Elayampalayam, 6
k.m. away from Tiruchengode. This is biggest women's college in India with more than 7500 girl students and more than 18 departments. The strength of the college was just 65 at the time of its establishment. With the dedication, work, sacrifice and long vision of the chairman, this institution has grown into a Himalaya stage. As a result of which UGC, New Delhi, awarded 2f and 12b, extended Autonomous status for second cycle. The National Assessment and Accreditation Council reaccredited with grade 'A' for its successful performance.

As an Autonomous Institution, academic professionals of the college framed Curriculum and Syllabi in consultation with all its stakeholders to cater the needs of the young women to fulfil the women empowerment and present Industrial needs to the local benefits. The students are empowering with confidence and required skills to face the society.

Quality Policy

To provide professional training by establishing a high level centre of learning that provides quality education at par with the international standards and Provide excellence education with well equipped infrastructure to all the rural women.

Our Vision

To be an academic institution exclusively for women, in dynamic equilibrium with the social and economic environment, strive continuously for excellence in education, research and technological service to the nation.

Our Mission

The mission of our institution is to discover, teach and apply knowledge for the intellectual, cultural, ethical, social and economic growth of women students.

REGULATIONS

I. SCOPE OF THE COURSE

B.Sc. (Physics), the recent developments in Physical sciences, has been included in the enriched syllabus to meet out the present day needs of academic and research, institutions and industries. The program expects a serious commitment of the student to take up challenging study schedules and assignments. The course involves a blend of theoretical education and practical training which run concurrently for a period of three years and equips a student with knowledge, ability, skills and other qualities required for a professional accountant.

The uniqueness of the program is its content and topic coverage, the teaching methodology and the faculty. The syllabus has been designed at a level equal to that of professional courses. The teaching methodologies include classroom lectures, industrial visits, orientation, internship, case study and research work. Focus is also on developing soft skills of the students. For Core subjects, Outsource Guest Lectures by Industrialists and Professional Men will be arranged to enable the students to get wider exposure.

II. SALIENT FEATURES

- ✓ Course is specially designed for a higher level Career Placement.
- ✓ Special Guest lecturers from Industrialists will be arranged.
- ✓ Exclusively caters to students interested in pursuing higher studies.
- ✓ Special Industry Orientations and Training are parts of the Degree Course.
- ✓ Project work is included in the syllabus to enhance conceptual, analytical & deductive skills.

III. OBJECTIVES OF THE COURSE

- ✓ The new syllabus throws light on the recent and emerging areas of Physics.
- ✓ Enable the students understand Physics and make them more relevant to the society.
- ✓ Develop the analytical ability in students so that they are become objective in solving problems.
- ✓ Help the students learn practical skills in a better way.
- ✓ Inculcate research aptitude in students.
- ✓ Enable the students to go to higher levels of learning Physics.
- ✓ Improve the employability of the students.
- ✓ To inspire the students to apply their knowledge gained for the development of society in general.

IV. ELIGIBILITY FOR ADMISSION

Candidates seeking admission to the first year Degree course (B.Sc. Physics) shall be required to have passed Higher Secondary Examination with Physics as one of the Subjects conducted by the Government of Tamil Nadu.

V. DURATION OF THE COURSE

- ✓ The course shall extend over a period of three academic years consisting of six semesters. Each academic year will be divided into two semesters. The First semester will consist of the period from July to November and the Second semester from December to March.

- ✓ The subjects of the study shall be in accordance with the syllabus prescribed from time to time by the Board of Studies of Vivekanandha College of Arts and Sciences for Women with the approval of Periyar University.
- ✓ Each subject will have six hours of lecture per week apart from practical training at the end of each semester.

VI. CONTINUOUS INTERNAL ASSESSMENT

The performance of the students will be assessed continuously and the Internal Assessment Marks will be as under:

1. Average of three Test - 15 Marks
2. Assignment - 5 Marks
3. Attendance - 5 Marks

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Total = 25 Marks

……

The distribution of attendance marks is given as follows,

76-80 %	- 1 Mark
81-85 %	- 2 Marks
86-90 %	- 3 Marks
91-95 %	- 4 Marks
96-100 %	- 5 Marks

VII. Question Paper Pattern:

Question Paper Pattern for the Examinations

Time: 3 Hours Maximum Marks: 75

Part A: Answer all the following Questions (choose the best answer) (20 x 1 = 20 Marks)

Part B: Answer all questions (Either or type) (5 x 5 = 25 Marks)

Part C: Answer any three of the following questions (3 x 10 = 30 Marks)

VIII. PASSING MINIMUM

In the University Examinations, the passing minimum shall be 40 % out of 75 Marks for theory (30 marks) and 40% out of 60 marks for practical (24 Marks).

IX. ELIGIBILITY FOR EXAMINATION

A candidate will be permitted to appear for the University Examination only on earning 75 % of attendance and only when her conduct has been satisfactory. It shall be open to grant exemption to a candidate for valid reasons subject to conditions prescribed.

X. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Successful candidates passing the examination of Core Courses (main and allied subjects) and securing marks

a) 75 % and above shall be declared to have passed the examination in first class with Distinction provided they pass all the examinations prescribed for the course at first appearance itself.
b) 60% and above but below 75 % shall be declared to have passed the examinations in first class without Distinction.
c) 50%and above but below 60% shall be declared to have passed the examinations in second class.
d) All the remaining successful candidates shall be declared to have passed the examinations in third class.
e) Candidates who pass all the examinations prescribed for the course at the first appearance itself and within a period of three consecutive academic years from the year of admission only will be eligible for University rank.

XI. COMMENCEMENT OF THESE REGULATIONS

These regulations shall take effect from the academic year 2021 - 2022 (i.e.,) for the students who are to be admitted to the first year of the course during the academic year 2021 - 2022 and thereafter.

XII. COURSE PATTERN

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)
SYLLABUS FRAME WORK 2021 – 2022 Onwards

Subjects	Inst. Hour/Week	Credit	Exam ours	Internal	External	Total Marks	Subjects	Inst. Hour/Week	Credit	Exam ours	Internal	External	Total Marks
YEAR - I													
Semester - I							Semester - II						
Language I	6	3	3	25	75	100	Language II	6	3	3	25	75	100
English I	6	3	3	25	75	100	English II	6	3	3	25	75	100
Core I	5	5	3	25	75	100	Core II	5	5	3	25	75	100
Core I Practical	3	0	3	-	-	-	Core I Practical	3	3	3	40	60	100
Allied I	5	3	3	25	75	100	Allied II	5	3	3	25	75	100
Allied I Practical	3	0	3	-	-	-	Allied I Practical	3	4	3	40	60	100
Valued Added Course	2	2	3	25	75	100	Valued Added Course	2	2	3	25	75	100
Total	30	16	21	125	375	500	Total	30	23	21	205	495	700
I Y EAR TOTAL									39	42	330	870	1200
YEAR - II													
Semester - III							Semester - IV						
Language III	6	3	3	25	75	100	Language IV	6	3	3	25	75	100
English III	6	3	3	25	75	100	English IV	6	3	3	25	75	100
Core III	4	5	3	25	75	100	Core IV	4	5	3	25	75	100
Core II Practical	3	-	3	-	-	-	Core II Practical	3	3	3	40	60	100
Allied III	4	3	3	25	75	100	Allied IV	4	3	3	25	75	100
Allied II Practical	3	-	3	-	-	-	Allied II Practical	3	3	3	40	60	100
SBEC I	2	2	3	25	75	100	SBEC II	2	2	3	25	75	100
NMEC I	2	3	3	25	75	100	NMEC II	2	3	3	25	75	100
Total	30	19	24	150	450	600	Total	30	25	24	230	570	800
II YEAR TOTAL									44	48	380	1020	1400
YEAR - III													
Semester - V							Semester - VI						
Core V	5	5	3	25	75	100	Core VIII	5	5	3	25	75	100
Core VI	5	5	3	25	75	100	Core IX	5	5	3	25	75	100
Core III Practical	3	-	3	-	-	-	Core III Practical	3	4	3	40	60	100
Core IV Practical	3	-	3	-	-	-	Core IV Practical	3	4	3	40	60	100
Core VII	5	5	3	25	75	100	Elective II	5	5	3	25	75	100
Elective I	5	5	3	25	75	100	Elective III	5	5	3	25	75	100
SBEC III	2	2	3	25	75	100	SBEC V	2	2	3	25	75	100
SBEC IV	2	2	3	25	75	100	SBEC VI	2	2	3	25	75	100
							Extension work	-	1	-	-	-	-
Total	30	24	24	150	450	600	Total	30	33	24	230	570	800
TOTAL CREDIT FOR THE COURSE									140	138	1090	2910	4000

Distribution of Duration and Credit under Different Papers

Part	Paper	Hours/Week	Weeks/Semester	Hour/Paper	No. of Papers	Credit/Paper	Total Hours	Total credit
I	Language	4	15	60	4	3	240	12
II	English	4	15	60	4	3	240	12
III	Core paper	5	15	75	9	5	675	45
III	Core practical	3	15	45	4	3/4	180	14
III	Allied	5	15	75	4	3	300	12
III	Allied practical	6	15	90	2	3	180	6
IV	Value Education	4	15	60	2	2/4	120	6
IV	SBEC	2	15	30	6	2	180	12
III	Elective	3	15	60	2	5/4	120	14
IV	NMEC	2	15	30	2	3	60	6
IV	Extension work	1	15	15	1	1	15	1
TOTAL								140

XIII.LIST OF CORE PAPERS:

S.No	Course Code	Course Title
1.	21U1PHC01	Properties of Matter and Acoustics
2.	21U2PHC02	Mechanics
3.	21U3PHC03	Heat and Thermodynamics
4.	21U4PHC04	Optics
5.	21U5PHC05	Electricity and Magnetism
6.	21U5PHC06	Quantum Mechanics and Relativity
7.	21U5PHC07	Solid State Physics
8.	21U6PHC08	Atomic Physics
9.	21U6PHC09	Nuclear Physics

LISTOF ELECTIVES

S.No	Course Code	Course Title
1.	21U5PHE01	Basic Electronics
2.	21U6PHE02	Electronics and Communication
3.	21U6PHE03	Numerical Methods
4.	21U5PHE04	Nanoscience
5.	21U6PHE05	Astrophysics
6.	21U6PHE06	Mathematical Physics

XIV. LIST OF SKILL BASED ELECTIVES

S.No	Code	Course Title
1	21U3PHS01	Laser Technology
2	21U4PHS02	Energy Physics
3	21U5PHS03	Digital Electronics
4	21U5PHS04	Bio medical Instrumentation
5	21U6PHS05	Microprocessor and its application
6	21U6PHS06	Electrical Appliances

XV. NON MAJOR ELECTIVE COURSE

S.No	Code	Course Title
1	21U3PHN01	Essentials of Electricity
2	21U4PHN02	Physics in Everyday Life

XVI. ALLIED PHYSICS

S.No	Code	Course Title
1	21U1PHA01	Allied Physics – I
2	21U2PHA02	Allied Physics - II

SEMESTER - I

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U1PHC01	Title	Batch	2021 – 2024
Hrs/Week	5	CORE - I: PROPERTIES OF MATTER AND ACOUSTICS	Semester	I
			Credits	5

COURSE OBJECTIVES

To acquire the basic knowledge about

1. To enable the students in order to learn the basic principles.
2. To understand the concepts of properties of matter and acoustics.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	Be familiar with the basic concepts and basic formalisms of elastic properties.	K2
CO2	Basic ideas of Bending of Beams.	K1
CO3	Understand the dimensions of surface tension.	K2, K3
CO4	Know the definition and basic laws Viscosity.	K1, K2
CO5	Finding applications of the sound.	K3, K3

UNIT – I: Elasticity 12

Stress - Strain diagram - Different moduli of Elasticity – Factors affecting elasticity - work done per unit volume in shearing strain - Relation between Elastic moduli - Poisson's ratio - Twisting couple on a wire - work done in twisting ; Torsional pendulum - Determination of rigidity modulus - static torsion method with scale and telescope.

UNIT – II: Bending of Beams 12

Bending of beams - Expression for bending moment - Depression of the loaded end of the cantilever Young's modulus by measuring the tilt in a loaded cantilever – Uniform and Non uniform bending – theory - experiment pin and microscope and scale and telescope method - Determination of Young's modulus by Koenig's method.

UNIT – III: Surface Tension 12

Definition and dimensions of surface tension - Angle of contact and its determination - formation of drops- excess pressure inside the soap bubble – excess pressure inside the curved liquid surface - Experiment study of variation of surface tension with temperature - drop weight method of determining surface tension and interfacial surface tension – Quincke's method - angle of contact of mercury.

UNIT – IV: Viscosity 12

Newton's law of viscous flow - Coefficient of critical velocity - Poiseuille's formula coefficient of viscosity – correction for the formula - determination of co-efficient of viscosity by capillary flow method - comparison of viscosities – Oswald's viscometer - Stoke's method for the coefficient of a highly viscous liquid - variation of viscosity with temperature and pressure - viscosity of gases - Mayer's formula for the rate of flow of a gas through a capillary tube.

UNIT – V: Sound and Acoustics 12

Newton's Formula for velocity of sound – Effect of Temperature, Pressure - propagation of wave motion - mode of propagation - Frequency, Wavelength & velocity of sound waves – Sonometer - determination of frequency – Melde's apparatus – transverse and longitudinal waves.

Reverberation and time of reverberation - derivation of Sabine's formula, determination of absorption Coefficient. Ultrasonic's – production, properties and applications.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. Elements of properties of matter by D.S. Mathur, S. Chand and Co., 10th edition, (1984).
2. Properties of Matter by R. Murugesan, S. Chand and Co., (2004).
3. Properties of Matter by Brijlal & N. Subramaniam, S. Chand and Co., (2005).
4. Properties of Matter and Acoustics by R. Murugesan, S. Chand and Co.,(2005).
5. A Text Book of Sound by N. Subramaniam and Brijlal, S. Chand and Co., (2004).

BOOKS FOR REFERENCE:

1. Fundamentals of General Properties of Matter, H. R. Gulati, S. Chand and Co., (2005).
2. A Text Book of Sound, R .L. Saighal, S. Chand and Co., (2005).

3. Acoustics, Waves and Oscillations, S. N. Sen, New Academic Science, (2013).

ONLINE SOURCES:

1. www.khanacademy.org/science/physics/elasticity/surface tension.
2. www.khanacademy.org/science/physics/viscosity/acoustics.

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	2	3	3	2	1	2	1	1	3	2	3	3	2	2	3
CO2	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO3	2	3	3	2	1	2	1	1	3	2	3	3	2	2	3
CO4	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO5	2	3	3	2	1	2	1	1	3	2	3	3	2	2	3

3 - Strong; 2 - Medium; 1 – Weak

SEMESTER - II

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U2PHC02	Title	Batch	2021 - 2024
Hrs/Week	5	CORE - II: MECHANICS	Semester	IV
			Credits	5

COURSE OBJECTIVES

To acquire the basic knowledge about

1. To enable the students in order to learn the basic principles, theory and concepts of mechanics.
2. To gain knowledge by the students in order to learn the operating principles of machines used in daily life.
3. To acquire basic knowledge of working of machines.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	Outline the Relative motion, Inertial and non - inertial reference frames.	K1, K3, K4
CO2	Outline the Relative motion, Newton's law of Gravitation.	K1, K4
CO3	Understand the conservation laws and gravitation.	K1, K3
CO4	To know the laws of friction and hydrodynamics.	K1, K2, K3
CO5	Understand the formulation of Classical Mechanics and its applications.	K1, K4

UNIT – I: Projectile 12

Definition of Range, time of flight and angle of projection – Range up and down an inclined plane - maximum range – two directions of projections for a given velocity and range.

Impulse – Impact:

Laws of impact – coefficient of restitution – impact of a smooth sphere on a fixed smooth plane – Direct impact between two smooth spheres – Loss of kinetic energy in direct impact – velocity change in oblique impact between two smooth spheres.

UNIT – II: Laws of Motion and dynamics of Rigid bodies 12

Motion in two and three dimensions – relative motions – uniform circular motion – force and motions – Newton's law – mass inertia and force – gravitational force – applications of Newton's

second law – collision – kinetic energy in collision - moment of inertia - theorems of moment of inertia - Newton's law of universal gravitation - inertia and gravitational mass - motion in gravitational field due to a solid sphere and circular disc - Deduction of Newton's law of gravitation from Kepler's law.

UNIT – III: Conservation Laws and Centre of Gravity 12

Laws of conservation of mass, energy - linear momentum – angular momentum – angular acceleration and torque.

Centre of gravity of a body – distinction between centre of gravity and centre of mass – Centre of Pressure - centre of gravity of solid cone, solid hemisphere, hollow hemisphere and a tetrahedron.

UNIT – IV: Friction and Hydrodynamics 12

Friction: Laws of friction, angle of friction, cone of friction, equilibrium of a body on a rough inclined plane acted upon by an external force – friction dynamometer – friction clutch.

Hydrodynamics: Stream line flow- Equation of continuity of flow – energy of the liquid, Bernoulli's theorem - Applications of bernoulli's theorem, venturimeter, pitot tube.

UNIT – V: Classical Mechanics 12

Mechanics of system of particles – Constraints - Classification, generalized coordinates - transformation equation - principle of virtual work - D'Alembert's principle - derivation of Lagrange's equation of motion - formulation of conservation theorems - generalized momentum - energy and linear momentum – Application - Atwood's machine.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. R.Murugeshan, Mechanics and Mathematical Physics, S. Chand and Co., New Delhi, (2005).
2. Narayanamurthi and Nagaratnam, Dynamics, Eighth Edition, The National Publishing Company, Chennai (2008).
3. Narayanamurthi and Nagarathnam, Statics, Hydrostatics and Hydrodynamics, The National Publishing Company, Chennai (2008).

BOOKS FOR REFERNCES:

1. H. Goldstein, Classical Mechanics, Second Edition, Narosa Publishing House, New Delhi (2001).
2. D.S.Mathur and P.S.Hemne, Mechanics, Third Edition, S.Chand and Co., New Delhi, (1981).
3. S.L.Kakani, C.Hemrajani and S.Kakani, Mechanics, Third Edition, Viva Books Pvt., Ltd., New Delhi, (2005).
4. J.C.Upadhyaya, Mechanics, Ram Prasad Publications, Agra, (2017).
5. D. Halliday and R. Resnick and J. Walker, Fundamentals of Physics, Tenth Edition, Wiley, New York, (2013).

ONLINE SOURCES:

1. https://www.khanacademy.org/science/physics/forces-newtons - laws
2. http://nptel.ac.in/cources

MAPPING WITH PROGRAMME OUTCOMES

CO \ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO2	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO3	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO4	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO5	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2

3 - Strong; 2 - Medium; 1 – Weak

SEMESTER - III

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U3PHC03	Title	Batch	2021 - 2024
Hrs/Week	5	CORE - III: HEAT AND THERMODYNAMICS	Semester	II
			Credits	5

COURSE OBJECTIVES

To acquire the basic knowledge about

1. To enable the students in order to learn the basic principles.
2. To understand the concepts of Heat and Thermodynamics.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	Be familiar with the basic concepts and basicformalisms of specific heat.	K2, K4
CO2	Basic ideas of thermodynamics and entropy.	K1
CO3	Understand the central concepts and basicformalisms of low temperature physics.	K2, K4
CO4	Know the definition and basic laws in thermalphysics.	K1, K2
CO5	Finding applications of the physical quantities.	K3, K4

UNIT - I: Thermometry and Calorimetry 12

Introduction to Thermometry - Platinum resistance thermometer – correction - definition of specific heat capacity - determination of specific heat capacity by Newton's law of cooling - two specific heat capacities of gas - determination of C_V by Joly's differential steam calorimeter determination of C_p by Regnault's method.

UNIT - II: Thermodynamics 10

Zeroth and first law of thermodynamics - reversible and irreversible processes - second law of thermodynamics - Carnot's engine – efficiency Entropy – change of entropy in reversible and irreversible processes - temperature – entropy diagrams – third law of thermodynamics - Maxwell's thermodynamic relations.

UNIT - III: Transmission of Heat 14

Types of heat transfer – conduction, convection and radiation - thermal conductivity - Lee's disc method– Structure of Earth atmosphere - stability of the atmosphere- Greenhouse effect - Radiation - black body radiation – Wein's law – Raleigh Jean's law – Planck's law – Stefan's law – pyrometry – solar constant – Angstrom pyrheliometer - water flow pyrheliometer.

UNIT - IV: Low Temperature Physics 12

Basics of cryogenics – Joule Thomson effect - Regenerative cooling - Vacuum pumps - porous plug experiment - Liquefaction of helium - Helium I & II – Measurement of Low Temperature - adiabatic demagnetization – superconductivity – Refrigeration process - dilution refrigeration.

UNIT - V: Statistical Thermodynamics 12

Introduction to Statistical Thermodynamics - Bose - Einstein Distribution law - Fermi - Dirac Distribution Law - Energy relations - Helmholtz function - Gibb's function enthalpy - Tds equation – Clausius -Chaperon latent heat equation - specific heat relation.

Power point Presentations, Quiz and Assignment

BOOKS FOR STUDY:

1. Brij Lal, Subrahmanyam and P.S.Hemne, Heat, Thermodynamics and Statistical Physics, Revised Edition, S. Chand and Co., New Delhi, (2012).
2. D.S.Mathur, Heat and Thermodynamics, Fifth Edition, Sultan Chand and Sons, New Delhi, (2014).
3. R. Murugesan and Kiruthiga Sivaprasath, Thermal Physics, Second Edition, S.Chand and Co., New Delhi, (2004).
4. Richard Wolfson, Essential University Physics, Pearson Education India Pvt., Ltd., New Delhi, (2009).

BOOKS FOR REFERENCES:

1. J.B.Rajam and C.L.Arora, A Text Book of Heat and Thermodynamics, Ninth Edition, S.Chand and Co., New Delhi, (1981).
2. Satya Prakash and J.P.Agarwal, Thermodynamics and Statistical Physics, Pragati Prakashan, Meerut, (2020).
3. Sharma J.K & Sarkar K.K., Thermodynamics and Statistical Physics, Second Edition, HimalayaPublishing House Pvt., Ltd., Mumbai, (2018).
4. S.L.Kakani, Heat, Thermodynamics and Statistical Physics, Sultan Chand & Sons, New Delhi, (2009).
5. Christian E. and Siegfried H, Low Temperature Physics, Springer, (2010).

ONLINE SOURCES:

1. https://www.khanacademy.org/science/physics/thermodynamics
2. https://www.khanacademy.org/science/physics/thermodynamics/laws-of thermodynamics/v/macrostates-and-microstates

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	2	3	3	2	1	2	1	1	3	2	3	3	2	2	3
CO2	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO3	2	3	3	2	1	2	1	1	3	2	3	3	2	2	3
CO4	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO5	2	3	3	2	1	2	1	1	3	2	3	3	2	2	3

3 - Strong; 2 - Medium; 1 – Weak

SEMESTER - IV

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U4PHC04	Title	Batch	2021 - 2024
Hrs/Week	5	CORE - IV: OPTICS	Semester	III
			Credits	5

COURSE OBJECTIVES

To acquire the basic knowledge about

1. The aim of the course is to introduce the students to the optics.
2. Acquire basic knowledge of the optical instrument, propagation of light, nature and behavior of light and its application etc.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	Be familiar with the basic concepts and basic formalisms of Geometrical Optics.	K3
CO2	Basic ideas of Bending of Diffraction.	K2
CO3	Understand the dimensions of Interference.	K2, K3
CO4	Know the definition and basic laws Polarization.	K1, K4
CO5	Finding applications of the Optical Instruments.	K3, K2

UNIT – I: Geometrical Optics 12

Dispersion through a prism – Dispersive power - Combination of two small angled prisms to produce dispersion without deviation – Constant Deviation Spectrometer- Deviation without dispersion – Direct vision Spectrometer

Spherical aberration in lenses – Methods of minimizing spherical aberration – Condition for minimum spherical aberration in the case of two lenses separated by a distance – Chromatic aberration in lenses – Condition for achromatism of two thin lenses (in contact and out of contact) – Coma.

UNIT – II: Diffraction 12

Diffraction – Coherence - Phase difference and Path difference – Fresnel and Fraunhofer diffraction - Rectilinear Propagation of light – Zone plate – Fraunhofer diffraction at a single slit.

Theory of plane transmission grating - Normal incidence and oblique incidence - Condition for absence of spectra - Overlapping spectra - Grating at oblique incidence - Diffraction due to straight

edge - Prism and grating spectra - Dispersive power of grating - Determination of wavelength of light using transmission grating.

UNIT - III: Interference 12

Interference - Superposition of waves – Young's double slit experiment – Wave front divisions – Condition for interference. Air wedge – Newton's rings. Techniques for obtaining interference Fresnel's biprism - Determination of wave length of monochromatic light – Michelson Interferometer – Fabry - Perot interferometer.

Holography – Construction, reconstruction of a hologram - properties of holography– Applications.

UNIT – IV: Polarization 12

Polarization - Transverse wave - Double refraction - Ordinary ray and extraordinary ray - Huygens explanation in uniaxial crystals - Quarter wave plate and Half waveplate - Production and detection of Plane, circularly, Elliptically polarized light – Babinets Compensator – Nicol prism as an analyzer and polarizer - Optical Activity - Fresnel's explanation of optical activity – Specific rotation - Laurent's half shade polarimeter.

UNIT – V: Optical Instruments 12

Microscopes – Simple, Compound, Ultra – Huygens Eye pieces and Ramsden's Eye pieces - Comparison - Resolving Power - Rayleigh's Criterion.

Telescope – Refracting astronomical telescope – Abbe Refractometer – Pulfrich refractometer - Photographic Camera Resolving power of Telescope, Microscope, Grating.

Power point presentation, Quiz and Assignment

BOOK FOR STUDY:

1. A Text book of Optics – Subramanyam, Brij Lal and Avadhanulu, S. Chand & Co., New Delhi, (2007).
2. Optics and Spectroscopy - R. Murugesan and Kiruthiga Sivaprasath, S. Chand & Co., New Delhi, (2006).

BOOK FOR REFERENCE:

1. Optics by Ghatak. A, Tata McGraw Hill, New Delhi, (2009).
2. Optics - Eugene Hecht, Fourth Edition, Pearson Education, New Delhi, (2007).

ONLINE SOURCES:

1. https://www.khanacademy.org/science/physics/geometric-optics
2. http://nptel.ac.in/courses

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO2	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO3	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO4	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO5	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2

3 - Strong; 2 - Medium; 1 – Weak

SEMESTER - V

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U5PHC05	Title	Batch	2021 - 2024
Hrs/Week	5	CORE - V: ELECTRICITY AND MAGNETISM	Semester	V
			Credits	5

COURSE OBJECTIVES

To acquire the basic knowledge about

1. To gain knowledge about the principle and working of electrical circuits.
2. Acquire basic knowledge about handling electrical circuits.
3. Know about types of electricity.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	To study about introduction of electrostatics and its applications.	K1, K3
CO2	To gain knowledge about effect of electric field and magnetic field.	K1, K3
CO3	To study the relation between thermal energy and Electric current.	K1, K2
CO4	To understand and analyzing the basics of Alternating current and its measurements.	K3, K4
CO5	To acquire knowledge about electrical measurements devices and its uses.	K2, K3

UNIT - I: Electrostatics 12

Introduction - Electric field and Electric intensity – Force between a point charge and linear charge distribution - Electrostatic potential - Potential and intensity at a point due to a dipole - Electric potential at a point due to an electric quadrupole and a charged sphere - Electric potential energy - Energy of a system of charges – Coulomb's inverse square law – Gauss theorem and its applications (Intensity at a point due to a charged sphere & cylinder) – Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charges.

UNIT - II: Magnetic Effect of Electric Current 12

Faraday's law of electromagnetic induction - Lenz law - Fleming's right hand rule - Oersted's experiment - Laplace's law and Ampere's law - Magnetic field at the centre of a circular coil carrying current - Magnetic field at a point due to a straight conductor carrying current - Magnetic field at a point on the axis of a circular coil carrying current - Magnetic field at a point on the axis of a Solenoid - Force experienced by a conductor carrying current placed in a magnetic field of Uniform Intensity - Force between two conductors carrying current - Self inductance of a solenoid - Mutual Inductance of a pair of solenoids – Theory of Ballistic galvanometer - Damping correction – uses.

UNIT - III: Heating Effect of Electric Current 12

Introduction – Heat developed in a conductor carrying current – Callendar and Barnes Continues flow method - Temperature of a conductor carrying electric current - Applications of heating effect of electric current - Measurement of Electric power.

Thermoelectricity: Seebeck effect - Laws of thermo emf - intermediate metals, intermediate temperature - S.G. Starling method for Peltier and Thomson effect - Thermodynamics of thermocouple - Determination of π and σ - Thermoelectric diagrams and their uses.

UNIT - IV: Electrical Measurements 12

Definitions – Practical units - Laws of resistance - Current density - Kirchhoff' laws – Whetstone's Bridge - Sensitiveness of a Wheat stone's Bridge – Carey - Foster's Bridge - Determination of temperature coefficient - Kelvin's Double Bridge – Potentiometer - determination of internal resistance of a cell - Comparison of EMF's of Two cells - Measurement of thermo emf - Measurement of potential difference and current – Calibration of Voltmeter and Ammeter (High and low range).

UNIT - V: Alternating Current Circuits 12

AC- measurement of AC - Power factor – RMS, Average value of current and emf - LR, LC, CR and LCR Circuits (Series and Parallel) - Sharpness of resonance – Q factor – Power in AC circuits Growth and decay - Power factor in LR and CR circuits - AC and DC motors - Types of windings – Series, Parallel and Compound Windings - Transformers and its Uses - Three phase, delta and star connections – Choke coil – Tesla coil - Skin effect.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. R.Murugeshan, Electricity and Magnetism, Tenth Edition, S.Chand and Co., New Delhi, (2019).
2. Brij Lal and N.Subrahmanyam, Electricity and Magnetism, Twentieth Edition, Ratan Prakashan Mandir, Agra, (2016).

BOOKS FOR REFERENCE:

1. D.N.Vasudeva, Fundamentals of Magnetism and Electricity, Ninth Edition, S.Chand and Co., New Delhi, (2013).
2. Narayanamurthi and Nagaratnam and Lakshminarayan, Electricity and Magnetism, Third Edition, the National Publishing Company, Chennai, (1997).
3. K.K Tewari, Electricity and Magnetism, S.Chand and Co., New Delhi, (1987).

ONLINE SOURCES:

1. https://books.google.co.in/books/about/Electricity_and_Magnetism_10th_Edition.html?id=cERxDwAAQBAJ&redir_esc=y
2. https://www.schandpublishing.com/books/higher-education/physics/electricity-magnetism/9789352534319/#.X2mdQPYzY2w
3. https://thefactfactor.com/facts/pure_science/physics/gausss-theorem/8688/
4. https://byjus.com/physics/energy-stored-in-a-capacitor/
5. https://www.google.co.in/search?ei=JptpX4njFNOy9QPViJiwBA&q=Electricity+and+magnetism&oq=Electricity+and+magnetism&gs_lcp
6. https://www.vedantu.com/physics/sharpness-of-resonance
7. https://byjus.com/physics/electricity-and-magnetism/
8. https://phys.libretexts.org/Bookshelves/Electricity_and_Magnetism

MAPPING WITH PROGRAMME OUTCOMES

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CO4	3	2	3	2	3	3	1	2	2	3	1	1	2	2	1
CO5	3	3	3	1	3	2	1	1	3	3	1	2	1	1	2

3 - Strong; 2 - Medium; 1 – Weak

SEMESTER - V

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U5PHC06	Title	Batch	2021 - 2024
Hrs/Week	5	CORE - VI: QUANTUM MECHANICS AND RELATIVITY	Semester	V
			Credits	5

COURSE OBJECTIVES

To acquire the basic knowledge about

1. To account for the concepts, language and formalism of basic quantum mechanics.
2. To focus in more or less equal parts on the fundamental principles of the theory and on elementary applications of those principles.
3. To develop the problem solving ability.
4. To describe the importance of quantum physics in nature, engineering and society.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	Able to explain the fundamental principles of quantum theory, such as complementarily, correspondence, and uncertainty, as well as their experimental roots.	K1, K2
CO2	Utilize the postulates of quantum mechanics to describe quantum systems and determine their properties, Analyzing, including the results of measurements. Use operator techniques to solve relevant problems.	K2, K4
CO3	Construct Schrodinger equation and illustrate the solutions of exactly solvable models in quantum mechanics	K1, K3
CO4	Become familiar with the basic problems of quantum mechanics for which exact solutions- of the Schrödinger equations are possible.	K3, K4, K5
CO5	Making familiar with the fundamental principles of the general theory of relativity and to know the meaning of basic concepts like inertial frames, transformations, etc.,	K1, K2, K5

UNIT - I: Wave Nature of Matter 12

Inadequacy of Classical and Quantum mechanics - Dual nature of matter - Expression for de - Broglie wavelength – de-Broglie concept of stationary orbits.

Experimental study of matter waves : Davison – Germer's experiment- G.P Thomson experiment for

verifying de - Broglie relation - Expression for group velocity - Group Velocity for de - Broglie waves - Relation between wave velocity and group velocity - Wave packet - application of quantum theory of radiation.

UNIT - II: Uncertainty Principle and Operators 12

Heisenberg's Uncertainty Principle - Physical significance of Heisenberg's Uncertainty relation - Illustration of Uncertainty principle: Gamma ray microscope - Diffraction of a beam of electrons by a slit – Applications of Heisenberg's Uncertainty Principle.

Operators in Quantum Mechanics : Operators for Momentum, Kinetic energy, Total energy - Linear operator - Adjoint operators - Ladder operators L_+, L_- – Commutators - Commutation relation between position and momentum - Commutation relation between Spin and Angular momentum.

UNIT - III: Wave Mechanics 12

Basic postulates of wave Mechanics - Wave function for a free particle - Physical interpretation of wave function - Equation of motion of matter waves: Schrodinger equations (Time Independent and Time Dependent Equations, For free particle) – Properties of wave function - Orthogonal, Normalized and Orthonormal wave function - Expectation values of dynamical quantities - Probability current density - Ehrenfest's theorem - Statement and proof - Eigen value and Eigen function equations.

UNIT - IV: Applications of Schrodinger Equations 12

Application of Schrodinger's equation to one dimensional problems : The free particle – The Particle in a Box Infinite square well potential - particle in a rectangular Potential step - Reflection and Transmission co-efficient of rectangular potential barrier - Application of a barrier penetration (α-Decay) – One dimensional Linear harmonic oscillator - Rigid rotator – Hydrogen atom.

UNIT - V: Theory of Relativity 12

Special theory of relativity - Postulates of special theory of relativity - Length contraction - Time dilation - Reference systems - Inertial and Non-inertial frames - Galilean transformation equations - Lorentz transformation equations - The Ether hypothesis - The Michelson - Morley experiment – Relativity of Simultaneity – Addition of Velocities - Variation of mass with velocity - Mass-Energy Relation - Elementary ideas of general theory of relativity.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. R.Murugeshan and Kiruthiga Sivaprasath, Modern Physics, S.Chand & Co, New Delhi, (2016).
2. G. Aruldass, Quantum Mechanics, PHI Learning Pvt. Ltd., New Delhi, (2019).
3. P.K. Palanisamy, Relativity and Quantum Mechanics, Scitech Publications India Pvt., Ltd, Chennai, (2007).
4. S.L. Gupta, V. Kumar and H.V. Sharma, Quantum Mechanics, Jai Prakash Nath & Co., Meerut, (2017).

BOOKS FOR REFERENCE:

1. Satya Prakash and Swati Saluja, *Quantum Mechanics*, Kedar Nath Ram Nath, Meerut, (2019).
2. V. Devanathan, *Quantum Mechanics*, Narosa Publishing House, New Delhi, (2005).
3. Leonard I. Schiff, *Quantum Mechanics*, Fourth Edition, McGraw Hill Education India Pvt., Ltd., New Delhi, (2017).

ONLINE SOURCES:

1. https://www.youtube.com/watch?v=IKJAJdDEqhM

2.https://www.youtube.com/watch?v=Rx9KdNjQmo&list=PL3V8X5qWC1MRmSvEMZUjTU3BisDsi2KqV

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	1	1	1	2	1	1	2	3	1	1	1	1	1
CO2	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1
CO3	2	1	2	3	2	2	1	1	1	2	1	2	1	1	1
CO4	2	1	2	1	2	2	2	3	2	1	3	3	1	1	1
CO5	2	3	1	2	2	2	3	2	2	2	2	2	1	1	1

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - V

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U5PHC07	Title	Batch	2021 - 2024
Hrs/Week	5	CORE – VII: SOLID STATE PHYSICS	Semester	V
			Credits	5

COURSE OBJECTIVES

To acquire knowledge of

1. To know the formation and structure of different solid materials.
2. To motivate the students in order to apply the principles of Solid State Physics in their research studies.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	Students will gain knowledge of basic theories of solid state structure.	K1, K2
CO2	Students acquire knowledge of X-rays and crystal defect.	K2, K4
CO3	Understand the basic knowledge of different magnetic materials and their properties.	K2, K3
CO4	Understand the basics of dielectrics and their properties.	K1, K3
CO5	Acquiring the knowledge of advanced materials and their uses.	K2, K3

UNIT – I: Crystal structure 14

Crystalline and Amorphous solids - Crystal Structure - Crystal Lattice - Unit cell - Bravais Lattices and Dimensions - Seven classes of crystal system - Miller indices - Interplanar distance - spacing between planes in SC, FCC and BCC - Atomic packing - Atomic radius - lattice constant and density - Crystal structures (SC, HCP, FCC, BCC) - Other cubic structures Diamond, NaCl , ZnS.

UNIT – II: Crystallography and Crystal Imperfections 12

X-rays: Bragg's law - Laue method - Rotating crystal method - Powder photograph method.

Bonding in Solids: Ionic - Covalent – Metallic - Molecular bonds.

Crystal Defects: Point defects - Line defects- Surface defects - Volume defects and Plane defects - Frenkel defect - Schottky defect – Edge dislocation - Screw dislocation.

Unit - III: Magnetic Properties 12

Different types of magnetic materials - classical theory of diamagnetism (Langevin's theory) - Langevin's theory of paramagnetism - Weiss theory of paramagnetism - quantum theory of ferromagnetism - anti ferromagnetism – ferrites - general properties of superconductivity - Meissner effect - BCS theory - Type I and II superconductors - Application of Superconductors.

UNIT - IV: Dielectrics 12

Definition of dielectrics - Different types of electric polarization - Frequency and temperature effects on polarization - Dielectric loss - Clausius - Mosotti relation - Determination of dielectric constant - Dielectric breakdown - Properties of different types of insulating materials.

UNIT - V: Advanced materials 10

Basics of Nanomaterials – Need and Origin of nano - top down and bottom up approaches - Polymers – Ceramics - cermet's - high temperature materials - thermoelectric materials – electrets - Nuclear engineering materials - plastics - metallic glasses - optical materials - super strong materials - Acoustic materials - fiber optic materials & uses.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. Gupta, Kumar, Solid State Physics, K.Nath & Co., Meerut, (2013).
2. Charles Kittel, Introduction to Solid State Physics, Eighth Edition, John Wiley & Sons, New York, (2004).
3. S. O. Pillai, Solid State Physics, New Age International Pvt., Ltd., New Delhi, (2006).

BOOKS FOR REFERENCE:

1. V.Raghavan, Material Science and Engineering, Prentice Hall of India Pvt., Ltd., New Delhi, (2004).
2. R.Murugeshan and Kiruthiga Sivaprasath, Modern Physics, S. Chand & Co., New Delhi, (2016).
3. M.Arumugam, Material Science, Anuradha Publications, Kumbakonam, (2004).
4. Leonid V.Azaroff, Introduction to Solids, Tata McGraw Hill Pvt., Ltd., New Delhi, (2004).
5. A.J. Deckker, Solid State Physics, Macmillan India Pvt., Ltd., New Delhi, (2004).

ONLINE SOURCES:

1. https://www.khanacademy.org/science/chemistry/states-of-matter-and-intermolecular-forces/s tates-of-matter/v/crystalline-and-amorphous-polymers
2. http://hyperphysics.phy-astr.gsu.edu/hbase/quantum/bragg.html

3. https://www.electrical4u.com/comparison-of-type-i-and-type-ii-superconductors/

4. https://www.photonics.com/Articles/Fiber_Optics_Understanding_the_Basics/a25151

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	3	2	2	3	2	1	3	2	1	2	2	1	2
CO2	2	1	2	2	1	3	3	2	1	3	2	3	1	1	1
CO3	1	3	2	2	2	3	1	3	2	3	1	1	1	1	1
CO4	1	3	2	1	3	2	2	2	2	1	1	2	1	2	1
CO5	1	1	3	2	3	2	3	1	2	1	2	1	1	1	1

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - VI

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U6PHC08	Title	Batch	2021 - 2024
Hrs/Week	5	CORE - VIII: ATOMIC PHYSICS	Semester	VI
			Credits	5

COURSE OBJECTIVES

To acquire knowledge and apply it to

1. To provide a detailed study of atom.
2. To learn the impact of magnetic fields on spectra.
3. To learn the behavior of atom in various states.
4. To provide a knowledge of the application of observed theories.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	Understand the atom models and their importance.	K1, K2
CO2	Describe how photoelectric cell works.	K2, K4
CO3	Acquire the knowledge about vector atom model.	K1, K2
CO4	Have knowledge about Fine Structure of Spectral Lines and calculate the Lande g-factor.	K1, K2
CO5	Understand the basics of X-rays and analyze the characteristics and structure of crystals by XRD technique.	K3, K4

UNIT - I: Positive Rays 10

Discovery - Properties of positive rays – e/m of positive rays - Thomson's Parabola method – Aston's mass spectrograph - Bain's bridge's mass spectrograph – uses of mass spectrographs - Critical potential – Ionization potential – Excitation potential - Methods of excitation - Determination of Critical Potential – Franck and Hertz's experiment - Dempster method.

UNIT - II: Photoelectricity 12

Photoelectric emission – Laws – Lenard's experiment – Richardson & Compton experiment - Failure of electromagnetic theory - Einstein's photoelectric equation – Experimental verification of Einstein's

Photoelectric equation by Millikan's experiment – Photo electric cells – Photo emission cell – Photo Voltaic cell – Photo conductive cell – Applications of Photo electric cell.

UNIT - III: Vector Atom Model 10

Introduction - Sommerfield atom model - Rutherford atom model - Bohr atom model - Various quantum numbers, Coupling schemes (LS, JJ coupling) – Pauli's exclusion principle – Electronic configuration of elements and periodic classification – Magnetic dipole moment of electron due to orbital and spin motion – Bohr magnetron – Stern and Gerlach experiment.

UNIT - IV: Fine Structure of Spectral Lines 15

Spectral terms and notations – Selection rules – intensity rule and interval rule – Fine Structure of sodium D lines – Fine structure in Alkali spectra – Spectrum of Helium – Zeeman effect – Larmour's theorem – Debye's quantum mechanical explanation of the normal Zeeman effect – Anamolous Zeeman effect – theoretical explanation, Lande's 'g' factor and explanation of splitting of D1 and D2 lines of sodium – Paschen back effect and Stark effect.

UNIT - V: X- Rays 13

Electromagnetic spectrum - Production of X-Rays - Absorption of X - Rays - Bragg's Law – Bragg's X-ray spectrometer - Powder crystal method – Origin and analysis of continuous X - ray spectrum and characteristic X - ray spectrum – Mosley's law (Statement, Explanation and Importance) – Compton effect – Derivation of expression for change in wavelength - its experimental verification.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. N.Subrahmanyam and Brij lal, Atomic and Nuclear Physics, S.Chand & Co.,New Delhi, (2004).
2. H.Semat and J.R. Albright, Atomic and Nuclear Physics, Chapman and Hall, (2003).
3. S.N.Ghoshal, Atomic and Nuclear Physics, S. Chand & Co., New Delhi, (2004).

BOOKS FOR REFERENCE:

1. Arthus Beiser, Concept of Modern Physics, McGraw Hill Education India Pvt., Ltd., New Delhi, (1999).
2. J.B.Rajam, Atomic Physics, S. Chand & Co., New Delhi, (2004).
3. R.Murugeshan and Kiruthiga Sivaprasath, Modern Physics, S.Chand & Co., New Delhi, (2016).

ONLINE SOURCES:

1. https://www.khanacademy.org/science/ap-chemistry/electronic-structure-of-atoms-ap/bohr-mo del-hydrogen-ap/a/photoelectric-effect
2. https://chem.libretexts.org/Courses/New_York_University/G25.2666%3A_Quantum_Chemistry_ and_Dynamics/2%3A_General_theory_of_spin/2.0%3A_Experimental_evidence_for_electron_spin /2.1%3A_Fine_structure_of_spectral_lines
3. http://hyperphysics.phy-astr.gsu.edu/hbase/quantum/xtube.html
4. https://sites.google.com/site/puenggphysics/home/unit-iii/bainbridge-mass-spectrograph

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
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CO4	3	1	2	3	3	2	1	1	2	3	1	3	2	1	1
CO5	3	1	3	2	3	1	2	3	2	1	3	3	2	1	1

3 - Strong; 2 - Medium; 2 – Low

SEMESTER - VI

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U6PHC09	Title	Batch	2021 - 2024
Hrs/Week	5	CORE - IX: NUCLEAR PHYSICS	Semester	VI
			Credits	5

COURSE OBJECTIVES

To acquire knowledge and apply it to

1. Study the structure of nucleus.
2. Know the formation of nucleus and their binding energy.
3. To motivate the students to analyse the energy released by the nucleus during the fission and fusion process and therefore understanding the working of Nuclear power stations.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	To study the introduction about nucleus and its properties.	K1, K2
CO2	To understand the particle detectors with mechanisms.	K2, K3
CO3	To gain knowledge about natural radioactivity and its decay process.	K2, K3
CO4	To explain the phenomenon of nuclear reactions and nuclear energy level.	K4, K5
CO5	To acquire knowledge of fundamental interaction of elementary particles.	K1, K2

UNIT – I: Introduction to the Nucleus 12

General Properties of Nuclei :Nuclear radius - Nuclear forces - Model of nuclear structure - Atomic mass unit - Nuclear magnetic moment - Magnetic dipole moment - Nuclear mass - Binding energy - Nuclear stability - Mass parabola - Nuclear Size - Nuclear spin - Nuclear isomerism - Nuclear forces - Magnetic dipole moment of nuclei - Parity of nuclei.

Nuclear models: Liquid drop model - Semi empirical mass formula - Shell model - Salient features of shell model.

UNIT–II: Nuclear Radiations 12

Detectors: Basic principles of particle detectors - Ionization chamber - G.M counter – Characteristics - Proportional counter - Wilson cloud chamber - Bubble chamber - Scintillation counters – Photomultipliers - Solid State detector.

Particle Accelerator: Synchrocyclotron – Synchrotron - Electron and proton synchrotron - Betatron.

UNITT – III: Natural Radioactivity 12

Properties of Alpha, Beta and Gamma rays – Geiger - Nuttal law - Gamow's theory of alpha decay - Neutrino theory of beta decay - Magnetic Spectrograph -Determination of the Wavelength of Gamma rays - Gamma emission - Selection rules -Interaction of charged particles with matter - Internal conversion - Fajan's Soddy displacement law - Law of radioactive disintegration - Half life period - Mean life period - Measurement of Decay constant - Unit of Radioactivity - Law of successive disintegration - Carbon dating.

UNIT – IV: Nuclear Reactions 12

Nuclear reactions – Types - Nuclear energy equations - Calculation of Q – value - Nuclear artificial transmutations - Transuranic elements.

Nuclear Fission and Fusion Reactions: Bohr-Wheeler's theory - Fission Process - Chain reactions - Nuclear Reactor - Principle - Pressurized water reactor - Boiling water reactor -Fusion Reactor - Atom bomb - Fusion process - Hydrogen bomb – Carbon - nitrogen cycle - proton - proton cycle - Thermo nuclear reactions - Stellar energy.

UNIT – V: Elementary Particles and Cosmic Rays 12

Elementary Particles : Introduction - Classifications of elementary particles - Fundamental interactions - Quantum Numbers - Baryon - Lepton - Strangeness - Hypercharge – Iso spin - Quark Model - Conservation law - Parity - Charge - CPT Theorem.

Cosmic Rays: Cosmic rays - Origin of cosmic rays - Latitude effect - Attitude effect – Primary and Secondary Cosmic rays- Cosmic Ray showers.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. V. Devanathan, Nuclear Physics, Narosa Publishing House, New Delhi, (2006).
2. D.C.Tayal, Nuclear Physics, Himalaya Publishing house, Mumbai, (2018).
3. R.Murugeshan, Modern Physics, Eighth Edition, S. Chand & Co., New Delhi, (2001).
4. S. B. Patel, Nuclear Physics: An Introduction, New Age International Publishers Pvt., Ltd., New Delhi, (1991).

BOOKS FOR REFERENCE:

1. B. L. Cohen, Concepts of Nuclear Physics, Tata McGraw Hill, New Delhi, (1988).
2. H. S. Hans, Nuclear Physics: Experimental and Theoretical, New Age International Publishers Pvt., Ltd., New Delhi, (2001).
3. D.C. Cheng and G.K. O'Neill, Elementary Particle Physics: An Introduction, Addison-Wesley, (1979).
4. B.N.Srivatsava, Basic Nuclear Physics and Cosmic rays, Pragati Prakashan, Meerut, (2016).

ONLINE SOURCES:

1. https://nptel.ac.in/courses/115/103/115103101/
2. https://www.youtube.com/watch?v=WD3YZPR_ee0
3. https://www.youtube.com/watch?v=6LoWEs8z1A4
4. https://books.google.co.in/books/about/Modern_Physics_18th_Edition.html?id=KDRlDwAAQBAJ&redir_esc=y
5. https://www.schandpublishing.com/author-details/r-murugeshan/690
6. https://fasrstaff834.weebly.com/modern-physics-book-by-murugesan.html

MAPPING WITH PROGRAMME OUTCOMES

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CO5	3	2	2	1	2	3	1	1	2	3	2	2	1	2	1

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - V

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U5PHE01	Title	Batch	2021 - 2024
Hrs/Week	5	ELECTIVE - I:	Semester	V
		BASIC ELECTRONICS	Credits	5

COURSE OBJECTIVES

To acquire the basic knowledge about

1. Basic knowledge of p-n junction diode, different rectification Process.
2. Knowledge on Fabrication of a transistor, different Configuration, Biasing, h parameters and learn the different applications of FET.
3. Studying the amplitude and frequency response of common amplification circuits.
4. Applying theories for different classes of amplifiers.
5. Understanding negative and positive feed backs for electronic components.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	To study the basic ideas about the Semiconductor and devices.	K1, K2
CO2	To learn about the construction and operation of transistor and JFET.	K1, K3
CO3	To acquire knowledge about construction and operations of various type of Amplifier and oscillators.	K2, K4
CO4	To study about the Construction, working, characteristics of Semiconductor devices.	K1, K3
CO5	To learn about Linear ICs and Operational Amplifiers.	K3, K5

UNIT - I: Semiconductors 10

Introduction to Semiconductors - Energy band diagram of semiconductors - Intrinsic semiconductor - Extrinsic Semiconductor – n - type semiconductor - p-type semiconductor - Charge on n - type and p - type semiconductors – Principle, construction, working, I-V characteristics and applications: pn junction diode - Zener diode - LED - Photo diode – Schottky diode - Tunnel diode.

UNIT - II: Transistor 12

Transistor - Basic configurations - CB, CE and CC mode - Transistor action - Relation between α, β

and γ - DC load line - DC bias and stabilization - Operating point - AC load line, transistor biasing - Fixed bias - Voltage divider bias – Transistor as a two part network - h parameter – Applications of transistors.

UNIT - III: Amplifiers and Oscillators 14

Amplifiers: Amplifiers – Gain, Frequency response, decibel and band width of an amplifier - Classification of amplifiers - Single stage and Multi stage RC couples CE amplifier - Class A,B,C - Power amplifiers - Push Full amplifier - Feedback amplifier - General theory of feedback - Principles of negative voltage feedback – Advantages - Emitter follower.

Oscillators: Oscillators - Criteria for oscillation – Construction, Operation and Applications: Hartley Oscillator - Colpitt's Oscillator - Wien's Bridge Oscillator - Phase Shift Oscillator – Piezo - Electric Oscillator.

UNIT - IV: Special Semiconductor Devices 14

Construction, working, characteristics, parameters and applications of FET – MOSFET - Comparison between FET and Transistor – Solar cell - Photo transistor - UJT - UJT relaxation oscillator – SCR - SCR as a switch.

UNIT - V: Operational Amplifiers and its applications 10

Op amp - Pin configuration - Characteristics of Op amp - Virtual ground - Off-set voltage - Common mode rejection ratio - Inverting amplifier - Non- inverting amplifier - Differential amplifier -– Application - op-amp as Adder - Subtractor – Integrator – Differentiator – Comparator – Multivirators - IC 741: Astable, Monostable and Bistable multivibrators.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. V. K. Mehta, Principles of Electronics, Twelfth Edition, S.Chand Publishing Company, New Delhi, (2020).
2. B.L. Theraja, Basic Electronics (Solid state), Fifth Edition, S.Chand Publishing Company, New Delhi, (2005).
3. R.S.Sedha, A Text Book of Applied Electronics, Revised Multicolor Edition, S.Chand Publishing Company, New Delhi, (1990).
4. D.Roy Choudhury and Shail Bala Jain, Linear Integrated Circuits, Fifth Multicolor Edition, New Age International Publishers Pvt., Ltd., New Delhi, (2017).

Books for References:

1. S.L.Gupta and V.Kumar, Thirty Fourth Edition, Hand book of Electronics, Pragati Prakashan, Meerut, (2013).

2. D. Chattopadhyay, P.C.Rakshit, B.Saha and N.N.Purkait, Foundations of Electronics, Third Edition, New Age International Publishers Pvt., Ltd., New Delhi, (2014).
3. S.L.Kakani and K.C.Bhandari, Electronics: Theory and Applications, Fourth Edition, New Age International Publishers Pvt., Ltd., New Delhi, (2011).
4. Jacob Millman, Christos C.Halkias and Satyabrata Jit, Electronic Devices and Circuits, Fourth Edition, Mcgraw-Hill Education India Pvt., Ltd., New Delhi, (2015).
5. Albert Malvino and David J.Bates, Electronic Principles, Seventh Edition, Mcgraw-Hill Education India Pvt., Ltd., New Delhi, (2017).

ONLINE SOURCES:

1. https://www.electronics-tutorials.ws/
2. https://www.makerspaces.com/basic-electronics/
3. https://gradeup.co/electronics-communication-exams/electronic-

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	3	2	3	1	3	1	1	3	3	1	2	1	1	1
CO2	3	3	2	3	3	3	1	1	1	3	1	3	1	1	1
CO3	3	3	3	1	1	1	1	3	3	2	1	1	1	1	1
CO4	3	3	2	3	3	3	1	1	2	3	1	3	1	1	1
CO5	3	1	3	2	3	3	3	3	2	1	3	3	1	1	1

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - VI

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U6PHE02	Title	Batch	2021 - 2024
Hrs/Week	5	ELECTIVE - II: ELECTRONICS AND COMMUNICATION	Semester	VI
			Credits	5

COURSE OBJECTIVES

1. The basics concepts of modulation of FM and PM.
2. Understand the communication elements of modulators.
3. Learn the characteristics of antennas and propagation of transmission.
4. To apply the types of Communication systems.
5. To understand the concept of Fiber optic communication.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	To explain the basics concepts of modulation of FM and PM.	K1, K2
CO2	To understand the fundaments of AM Transmitter and Receiver.	K2, K3
CO3	To explain the communication elements of modulators.	K2, K3
CO4	To Understand the characteristics of antennas and propagation of transmission.	K1, K2
CO5	To compare the fundaments of communication systems.	K2, K4

UNIT – I: Modulation and Demodulation 10

Types of Modulation - Amplitude modulation theory – Frequency spectrum of the AM wave – Representation of AM – Power relations in the AM wave – Generation of AM – Basic requirements - Description of frequency and phase modulation – Mathematical representation of FM – Frequency spectrum of the FM wave - Effects of noise on carrier – Percentage of modulation – Advantage and disadvantage – Demodulation – Transmitted and Essentials of demodulation – AM detector.

UNIT – II: AM Transmitter and Receiver Fundamentals 13

Low level modulation – High level modulation – TRF receiver – Super heterodyne principle – Super heterodyne receiver – Double conversion receiver – Image frequency rejection – S/N ratio – Sensitivity – Selectivity – RF amplifier – Mixer – Local oscillator – IF amplifier.

UNIT – III: Communication Elements 11

Variable frequency oscillator – Reactance modulator – PLL – Frequency multiplier – Power output amplifier – FM limiter - The discriminator – The ratio detector – AFC - Balanced modulator principle – Phase modulator – Frequency divider.

UNIT– IV: Antennas and Propagation 12

The half wave dipole – Its Characteristics - Impedance and radiation pattern – The folded dipole – Characteristic impedance and radiation pattern – Parabolic reflector antenna - Parasitic array antenna - Features and applications Transmission line – Cable types – Co - axial and wire – pair – Maximum power transfer - Sky Wave Propagation - Ionosphere – Eccles & Larmor Theory - Magneto Ionic Theory - Ground Wave Propagation.

UNIT – V: Fibre Optics 12

Optical fibre cable- Total internal reflection- propagation of light in optical fibres – Numerical aperture and Acceptance angle – classification of fibre optics – losses in fibre optics- attenuation, dispersion, bending - Fibre Optical Communication system- fibre optic sensors- Endoscope -temperature sensors

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. Electronic Communication, Modulation and Transmission-Robert J.Schoenbeck, Universal Book Stall, Delhi, (1992).
2. Electronic Communication Systems–George Kennedy, Tata McGraw Hill, 4th Edition, (2006).
3. Hand book of Electronics-Gupta & Kumar, Pragati Prakashan, Meerut, (2005).

BOOKS FOR REFERENCES:

1. Principles of Communication Engineering– Anokh Singh, S.Chand & Co., New Delhi, (1999).
2. Communication Electronics – N.D.Despande and others –Tat McGraw Hill, (2004).
3. Electronic Communication, Dennis Roddy and John Coolen, Prentice Hall Career and Technology, 4th edition, (1995).

ONLINE SOURCES:

1. https://www.shiksha.com/engineering/electronics-communication-engineering-chp
2. https://www.indiaeducation.net/engineering/engineering-branch/electronics-engineering-versus-electronics-communication-engineering.html
3. https://en.wikipedia.org/wiki/Communications_system
4. https://www.tutorialspoint.com/radar_systems/radar_systems_tutorial.pdf
5. https://www.mphysicstutorial.com/2021/02/eccles-larmor-theory-magneto-ionic-theory.html
6. https://www.google.co.in/search?ei=25ppX5TNFs7erQG0uJuQBQ&q=RADAR+communication+system&oq=RADAR+communication+system&gs_lcp
7. https://byjus.com/physics/satellite-communication/

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	1	1	2	3	1	1	3	3	1	1	1	2	1
CO2	3	3	3	1	3	2	1	2	3	3	2	3	1	2	2
CO3	3	2	3	3	2	1	2	3	2	1	3	2	1	2	1
CO4	2	3	3	2	3	2	1	1	3	2	2	2	2	1	1
CO5	2	2	2	2	1	2	3	3	3	1	2	3	2	2	1

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - VI

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U6PHE03	Title	Batch	2021 - 2024
Hrs/Week	5	ELECTIVE - III: NUMERICAL METHODS	Semester	VI
			Credits	5

COURSE OBJECTIVES

To acquire knowledge about

1. Mathematical equations which can be applied in physical problems.
2. To motivate the problem solving ability of students.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic of normal equation.	K3, K5
CO2	To get the knowledge about algebraic and transcendental equation.	K2, K4
CO3	To get the ability to solve the linear equations.	K2, K5
CO4	Acquire the knowledge about types of interpolation.	K3, K4
CO5	Analyze and understand the numerical integration.	K1, K2

UNIT – I: Curve Fitting 12

Introduction - Normal equations - Method of averages – Least square fitting – Straight line fit – nonlinear curve fit - Fitting a parabola.

UNIT – II: Numerical Solution of Algebraic and Transcendental Equations 12

Solving non – linear equation – bisection method – Successive approximation –Newton – Raphson method – Euler's Method - Modified Euler's method – Runge-Kutta method for (second and third orders).

UNIT – III: Simultaneous Linear Equations 12

Solution of simultaneous linear equation - Gauss elimination method – Jordan method - Jacobi

method modification – Gauss – Seidel method of iteration – Matrix method of inversion - Eigen value and Eigen vectors of a matrix.

UNIT – IV: Interpolation 12

Linear interpolation – Lagrange interpolation method – Newton forward and backward interpolation formula – Newton's interpolation formula for unequal intervals.

UNIT - V: Numerical Integration 12

Newton's forward and backward difference formula to compute derivatives – Numerical integration (Single integral): The trapezoidal rule - Simpson's 1/3 rule – Simpson's 3/8 rule - Extended Simpson's rule – Gaussian quadrature formula.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. Introductory Methods of Numerical analysis – S.S.Sastry, Prentice – Hall of India, New Delhi, 3rd Edition, (2003).
2. M.K. Jain, S.RA.K.Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, (2003).
3. S.D. Conte, C. Boor, Elementary Numerical Analysis, McGraw –Hill, Singapore, 3rd edition (1981).

BOOKS FOR REFERENCE:

1. Numerical Methods, A.Singaravelu – Meenakshi Agency, Chennai, (2001).
2. Numerical Methods for Mathematics, J.H. Mathews, Science and Engineering Prentice – Hall of India, New Delhi, (1998).
3. Applied mathematics for engineers and physicist, Louis A. Pipes and Lawrence R.Harvill, Third Edition, McGraw – Hill, New York, (2014).
4. Mathematical Methods for Physicists, Arfken, Weber and Harris, Seventh Edition Elsevier, (2012).

ONLINE SOURCES:

1. https://www.math.ust.hk/~machas/numerical-methods.pdf
2. https://learn.canvas.net/courses/1065 3. https://onlinecourses.nptel.ac.in/noc20_ma33/preview
4. https://mathematics.ku.edu/course-detail/math-581
5. https://www.google.co.in/search?ei=fJlpX5DhIrSLmgfavZWYDg&q=numerical+methods

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	2	2	3	2	2	2	2	1	1	2	2	2	3
CO2	2	2	2	1	1	1	1	2	2	2	2	2	3	2	1
CO3	2	2	2	1	2	2	2	2	2	3	2	1	2	2	2
CO4	2	1	3	2	2	2	1	2	2	1	1	2	2	2	2
CO5	3	2	2	2	2	2	1	1	2	2	2	1	2	1	2

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - III

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U3PHS01	Title	Batch	2021 - 2024
Hrs/Week	2	SBEC - I: LASER TECHNOLOGY	Semester	III
			Credits	2

COURSE OBJECTIVES

1. To enable the students to understand of the fundamental principles underlying the operation of lasers and their Spectroscopic applications.
2. To describe the various interactions of light and matter and to understand the use of laser technology in spectroscopic and industrial applications.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	To study the basic knowledge about energy levels of atoms and molecules.	K1, K2
CO2	Understand the basic principles and characteristics of lasers.	K1, K2
CO3	To understand and explain the principles of solid state, gas and semiconductor lasers.	K3, K4
CO4	To learn about gas and liquid laser source.	K3, K4
CO5	Study the applications of laser.	K3,K4

UNIT – I: Basic Concepts 6

Energy levels of atoms and molecules - Absorption and Emission of Light - Spontaneous and Stimulated emission - Active medium - Population inversion - Pumping mechanisms - Optical pumping - Einstein's coefficients and relation.

UNIT – II: Laser Characteristics 5

Basic characteristics - Spatial and Temporal coherence - Beam quality and output characteristics - Beam divergence and Focusing using optical system - Types of laser based output beam - Continuous pulsed lasers – Ultra short pulses.

UNIT – III: Solid State Lasers 4

Introduction - Nd - YAG Laser and Semiconductor diode lasers, construction - Energy level diagram - Excitation mechanisms and Application.

UNIT – IV: Gas and Liquid Lasers 4

He - Ne, CO_2 and Dye laser – Construction - Energy level diagram - Excitation mechanisms and Application.

UNIT – V: Laser Applications 5

Industrial Applications: Laser in industry - Laser welding - Laser cutting and Laser drilling - Laser marking - Lasers in communication - Lasers in medicine.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. Optical fiber and Laser, Principles and Applications - Anuradha De, New Age International Pvt., Ltd., New Delhi, (2010).
2. Optics and Spectroscopy, R.Murugeshan & Kiruthiga Sivaprasath, S.Chand & Company, New Delhi, (2010).
3. Elements of Spectroscopy, Gupta, Kumar & Sharma, Pragati Prakashan, Meerut, (2009).

BOOKS FOR REFERENCE:

1. Laser Systems and Applications - Nityan and Chowdry and Richa Verma, PHI, (2011).
2. An introduction to Lasers, N.Avadhanulu, Chand & Company, (2001).

ONLINE SOURCES:

1. https://onlinecourses.nptel.ac.in 2.https://theopenacademy.com/content/lecture-laserfundamentals-iii-count

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO2	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO3	1	2	2	3	1	1	1	2	2	1	2	2	3	3	2
CO4	1	2	2	3	1	1	1	2	2	1	2	2	3	3	2
CO5	1	2	2	3	1	1	1	2	2	1	2	2	3	3	2

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - IV

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U4PHS02	Title	Batch	2021 - 2024
Hrs/Week	2	SBEC - II: ENERGY PHYSICS	Semester	IV
			Credits	2

COURSE OBJECTIVES

1. To enable the students to aware about renewable energy types, energy resources and conservation of energy.

Course Outcomes (CO)

CO Number	CO Statement	Knowledge level
CO1	To know the basic concept of energy sources.	K1, K2
CO2	To understand the principles of solar thermal energy and its various applications.	K1, K3
CO3	To learn the principles of photovoltaic cells and its classification.	K1, K2
CO4	To study about introduction of biomass energy and its uses.	K1, K3
CO5	To study the basic of energy consumption, conservation.	K1, K3

UNIT - I: Conventional Energy Sources 6

World reserve Commercial energy sources and their availability –Various forms of energy – Renewable and Conventional energy system –comparison – Coal, oil and natural gas – applications – Merits and Demerits.

UNIT - II: Solar energy 5

Renewable energy sources – Solar energy – nature and solar radiation – components – Solar heaters - Solar Batteries - Solar Water Purifiers – Photo voltaic generation – merits and demerits.

UNIT - III: Biomass energy fundamentals 4

Biomass energy – Classification – Biomass conversion process - Bio diesel (basic idea).

UNIT - IV: Biomass Utilization 4

Gobar gas plants – Wood gasification – advantage & disadvantages of bio mass as energy source.

UNIT – V: Other forms of energy sources 5

Geo thermal energy – Wind energy – Ocean thermal energy conversion – Energy from waves and tides (basic ideas).

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. S. P.Sukhatme, Solar energy, Tata McGraw Hill Publishing Company, 2nd Edition (1997).
2. G.D.Rai, Non Conventional Energy Sources, Ed.IV, Khanna publishers, (2007).
3. G.N. Tiwari, solar energy, Ed., (2004).

BOOKS FOR REFERENCE:

1. B.H.Khan, Non Conventional Energy Sources, Tata McGraw Hill, Ed.II, (2012).
2. D.S.Chauhan, S.K.Srivastava, Non Conventional Energy Sources Ed.V, (2004).

ONLINE SOURCES:

1. https://onlinecourses.nptel.ac.in
2. https://www.khanacademy.org/science/physics/quantumphysics/photons/v/photoelectric-effect

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO2	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO3	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO4	3	2	2	1	1	3	1	1	2	3	2	2	1	1	2
CO5	1	2	2	3	1	1	1	2	2	1	2	2	3	3	2

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - V

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U5PHS03	Title	Batch	2021 - 2024
Hrs/Week	2	SBEC – III: DIGITAL ELECTRONICS	Semester	V
			Credits	2

COURSE OBJECTIVES

To give description for the students in order to

1. Learn the logic circuits.
2. Acquire basic knowledge of binary addition.
3. Understand the action and application of counters.
4. Get a deep knowledge of various memories used in computer circuits.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	Students Understand the structure of various number systems.	K1, K4
CO2	Students understand the logic gates.	K1, K2
CO3	Ability to design and solve the Boolean Algebra simplification and karnaugh maps.	K1, K3
CO4	Learn the working principle of shift register and its types.	K1, K2
CO5	Students get the knowledge about the timing circuits and flip flops.	K2, K3

Unit – I: Number System and Codes 5

Binary, Decimal, Octal, Hexadecimal – Inter conversion - Gray Code – Excess - 3 Code - ASCII Code.

Unit – II: Logic Gates 5

The basic Gates (OR, AND, NOT), Universal logic gates - NAND/NOR - DEMORGAN'S Theorems - XOR and XNOR Gates - using logic gates.

Unit – III: Combination of Logic Circuits 5

Laws of Boolean algebra - Solving Boolean expressions - Karnaugh map (2 & 3 Ways) - Half adder -

Full adder - Half subtractor - Full subtractor.

Unit – IV: Registers and Counters 4

Shift registers (right to left and left to right) - Series and parallel loading – Counters – Modulus of a counter - BCD Counter - Ring Counter.

Unit – V: Flip-Flops 5

R-S Flip – Flop (NOR and NAND gates) - D Flip-Flop - J-K Flip-Flop – Master - Slave Flip - Flop – T – Flip Flop.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. Digital electronics Circuits and system –V.K.Puri-McGraw HillPublising Company
2. Digital Principles and Applications, Donald P. Leach and Albert P. Malvino, 5th (1994).
3. Digital Electronics, D. A. Godse and A.P. Godse, Technical Publlsher, Pune, (2008).
4. Digital Electronics, Virendra Kumar, New Age International Publishers, (2007).
5. Digital Electronics, Avinashi Kapoor and L. K. Maheswari, Principles and Practice, Macmillan India Limited, (2004).
6. V. Vijayendran, Digital Fundamentals. S. Viswanathan Printers and Publishers Pvt. Ltd., (2009).

BOOKS FOR REFERENCES:

1. Integrated circuits, K.R Botkar, Khanna Publications, (1987).
2. Integrated Electronics, Analog and Digital Circuits and Systems, J. Millman and C. C. Halkias, Tata McGraw - Hill Education, New Delhi, (1991).
3. Morris Mano, Digital Logic and Computer Design, Pearson Education (2004).

ONLINE SOURCES:

1. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/
2. https://learnabout-electronics.org/Digital/dig10.php
3. https://www.allaboutcircuits.com/textbook/digital/
4. https://www.electrical4u.com/digital-electronics/
5. https://www.electronics-tutorials.ws/logic/logic_1.html

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	3	2	2	3	3	2	2	2	2	2	1	2	1
CO2	2	3	1	2	1	1	1	1	1	2	3	2	2	1	1
CO3	2	2	2	2	3	1	1	1	2	1	2	2	2	1	2
CO4	2	3	2	2	2	2	1	2	2	2	3	2	2	1	2
CO5	3	2	2	2	2	2	1	1	2	2	2	1	2	1	2

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - V

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U5PHS04	Title	Batch	2021 - 2024
Hrs / Week	2	SBEC - IV: BIO -MEDICAL INSTRUMENTATION	Semester	V
			Credits	2

COURSE OBJECTIVES

1. To Study the function of various transducer and electrodes in Medicine.
2. To Understand the Working Principles of various medicine instruments.
3. Updating the knowledge in ultrasonic and X-ray measurements in Medicine.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	To study the various electrode in medicine.	K1, K2
CO2	To Understand the principles of various medicine instruments.	K2, K3
CO3	To apply the aid devices for medicine instruments.	K2,K4
CO4	To Understand the medical equipments in medical fields.	K2, K3
CO5	To measure the ultrasonic and X-ray in Medicine.	K5, K3

UNIT – I: Bio potential Electrodes 5

Introduction - Bio potential – Electrodes - Design of medical instruments - Components of the bio-medical instrument System – Electrodes – Theory - Micro electrodes – depth and needle electrodes – Body surface electrodes – pH Electrodes.

UNIT – II: Bio potential Recorders 5

Electrocardiography (ECG) – Electroencephalogram (EEG) - Electromyography (EMG) - Electroretinography (ERG) - Electrooculography (EOG).

UNIT – III: Biomedical Aid Devices 4

Pacemakers - Types of pacemakers - Different modes of operation - Artificial heart valves - Anesthesia machine – Measurement of Blood Pressure - Measurement of Blood flow.

UNIT - IV: Specialised Medical Equipment 4

Blood cell counter - Electron microscope - X-Ray machine – Image Intensifiers – Angiography.

UNIT – V: Safety Instrumentation 6

Radio Monitoring instruments - Microshock and Macroshock – Endoscopes - Computer Tomography - Ultrasonic image instrumentation - MRI instrumentation.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. Dr.M.Arumugam, Bio-Medical Instrumentation, Anuradha Agencies, Kumbagonam, (2002).
2. Bio Instrumentation, John G. Webster, editor John Wiley & Sons, Inc, (2004).
3. Biological Instrumentation and methodology, P.K.Bajpai, S Chand & Co, New Delhi, (2010).
4. Medical Instrumentation: Application and Design, John G. Webster, John Wiley & Sons Inc, Fourth Edition, (2009).

BOOKS FOR REFERENCE:

1. Bio-medical instrumentation, Dr.M.Arumugam, Anuradha Agencies, (2009).
2. Handbook of Biomedical Instrumentation, Dr.R.S.Khandpur: Blood Cell Counters, Chapter (McGraw-Hill Professional, Third Edition, (2014).
3. Handbook of Biomedical Instrumentation, Dr R.S.Khandpur, McGraw Hill Education (India) Private Limited, Kindle Edition, (2014).

ONLINE SOURCES:

1. https://books.google.co.in/books/about/Biomedical_Instrumentation.html?id=StM_YgEACAAJ&redi r_esc=y
2. https://dokumen.tips/documents/biomedical-instrumentation-arumugam-instrumentation-marumu gam-handbook-of.html
3. https://www.google.co.in/search?ei=aJ5pX8KzEYSb9QPni5-wAw&q
4. http://www2.plantpono.org/biomedical_instrumentation_by_arumugam_text_full_download.pdf

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	1	2	3	1	1	2	3	1	1	2	2	1
CO2	2	3	3	1	3	2	1	2	3	3	2	3	1	2	1
CO3	1	2	3	3	2	1	1	3	2	1	3	2	2	2	2
CO4	2	3	3	2	3	2	1	1	3	3	2	2	2	1	2
CO5	1	1	2	2	2	2	3	3	3	1	3	3	1	2	1

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - VI

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U6PHS05	Title	Batch	2021 - 2024
Hrs/Week	2	SBEC - V: MICROPROCESSOR AND ITS APPLICATIONS	Semester	VI
			Credits	2

COURSE OBJECTIVES

On successful completion of this subject the student should have

1. The basic knowledge of computers and its processors.
2. To operate the processors with basic idea.
3. To develop background knowledge and core expertise on Microprocessor 8085.
4. To write assembly language programs of Microprocessor for various applications.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	To explain the basic concepts of digital fundamentals using microprocessor 8085.	K1, K2
CO2	To compare the fundamentals of architecture of 8085.	K2, K3
CO3	To understand the fundamental of instruction set of 8 bit.	K2, K4
CO4	To explains the basic concepts of counters.	K2, K4
CO5	To compile the ALP for an 8- bit Microprocessor INTEL 8085.	K4, K5

Unit – I: Introduction 3

Microprocessor - Evolution of microprocessor - Functional block diagram of micro computer - Microprocessor programming – Machine language and Assembly language.

Unit – II: Architecture 4

Microprocessor Architecture (Intel 8085) – ALU - Timing and Control unit - Data and Address bus - Pin Configuration - Flags – PSW.

Unit - III: Instruction Set 5

Intel 8085 Instructions set - Opcode and Operands - Instruction word size - Instruction cycle - Timing diagram - Addressing modes.

Unit - IV: Memories 5

Counter – Stack – Subroutines - Stack pointer - Internal data bus – Mnemonics – Soft Ware – Monitor.

Unit – V: Assembly Language Programs of 8085 7

Programs for Transferring a block of data 8-bit (i) Addition (ii) Subtraction (iii) Multiplication (iv) Division (v) Greatest and Smallest number (vi) Arranging numbers in Ascending and Descending order (vii) Square and Square root of a number.

Power point presentation, Quiz, and Assignment

BOOKS FOR STUDY:

1. B. Ram, Fundamentals of Microprocessor and Microcontrollers, Dhanpat Rai Publications, (2019).
2. P. Mathur, Introduction to Microprocessor, TMH, 3rd edition, (2006).
3. M. Gilmore, Microprocessor Principles and Application, TMH, 2nd edition, (1995).

BOOKS FOR REFERENCE:

1. Ramesh Gaonkar, Microprocessor Architecture Programming and application, Prentice Hall PTR, 5th edition, (2002).
2. A.K. Roy and K.M. Bunchandi, Advanced Microprocessor and peripherals, TMH, 2nd edition, (2009).
3. Microprocessor and Microcontrollers, A.Nagoor Kani, TMH, India, (2019).

ONLINE SOURCES:

1. https://en.wikipedia.org/wiki/Microprocessor
2. https://www.javatpoint.com/microprocessor-applications
3. https://books.google.co.in/books/about/Microprocessor_and_its_Applications.html?id=s2lu185uLu4C&redir_esc=y
4. https://scanftree.com/microprocessor/Applications-of-Microprocessors
5. https://www.watelectronics.com/what-is-a-microprocessor-architecture-types-its-applications/

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	1	2	3	1	1	2	3	1	1	2	2	1
CO2	2	3	3	1	3	2	1	2	3	3	2	3	1	2	1
CO3	1	2	3	3	2	1	1	3	2	1	3	2	2	1	2
CO4	2	3	3	2	3	2	1	1	3	3	2	2	1	1	2
CO5	1	1	2	2	2	2	3	3	3	1	3	3	1	1	1

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - VI

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U6PHS06	Title	Batch	2021 - 2024
Hrs/Week	2	SBEC - VI: ELECTRICAL APPLIANCES	Semester	VI
			Credits	2

COURSE OBJECTIVES

To acquire the basic knowledge about

1. Testing of electrical parameters, cables and measurements.
2. Select the proper instrument for suitable measurement.
3. Trouble shoot the faults in the given power supply circuits.
4. Identify various functional blocks/major components/ICs in the given UPS.
5. Identify and test various mechanical and electrical modules of the given appliances.
6. Identify electronics parts/components/modules of the given appliances.
7. Aware of models of different appliances and features.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	To learn about basics of electric, induction and dielectric heating.	K1, K2
CO2	To study about basic operation of welding and AC and DC welding techniques.	K2, K4
CO3	To acquire basic knowledge about AC and DC motors for home appliance.	K2, K3
CO4	To learn about common household electric and electronic appliance.	K1, K3
CO5	To know about basic operations common household electric and electronic equipments.	K2, K3

UNIT – I: Electrical Heating 5

Electrical heating - methods of electric heating - resistance heating - induction heating - high frequency eddy current heating - dielectric heating.

UNIT – II: Welding 5

Resistance welding - Electric arc welding - DC and AC welding equipment - Energy storage welding - Occupational hazards due to chemical reactions.

UNIT – III: Motors 4

Basics of DC & AC systems - Introduction to AC/DC Motors for Appliances (FHP Motors) - Single Phase Motors (FHP) - DC Motors - Universal Motors.

UNIT – IV: Domestic Appliances 5

Principle, Construction and Operation: Fans - Wet grinder - Mixer grinder - Refrigerator - Air conditioner and Air cooler - Battery and battery chargers.

UNIT – V: Home Appliances 5

Principle, Construction and Operation: Washing machine - Induction stove - Microwave oven - Vacuum Cleaner - Air Purifier.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. P.L. Soni, P.V. Gupta and V.S. Bhatnagar, A text book on Electric power, Second Edition, Dhanpatri Publications, New Delhi, (1995).
2. B.L. Theraja and A.K.Theraja, A Text Book of Electrical Technology, Volume - II, S.Chand and Co., New Delhi, (2009).

BOOKS FOR REFERENCE:

1. Graham Dixon, Electrical Appliances: The Complete Guide to the Maintenance and Repair of Domestic Electrical Appliances, Second Edition, Haynes Manuals Inc., England, (1995).
2. Alexander S.Langsdorf, Theory of Alternating Current Machinery, Second edition, Mcgraw-Hill Education India Pvt., Ltd., New Delhi, (2001).

ONLINE SOURCES:

1. https://www.electrical4u.com/
2. https://www.anixter.com/en_us/resources/literature/technical-references/the-basic- principles-of-electricity.html
3. https://en.wikipedia.org/wiki/Home_appliance
4. http://www.appliedelectronics.in/

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	3	2	1	3	2	1	3	1	1	2	1	1	1
CO2	2	1	2	3	1	3	1	2	1	3	2	3	1	1	1
CO3	1	3	2	1	1	3	1	3	2	3	1	1	1	1	1
CO4	2	3	2	1	3	2	1	1	2	1	1	2	1	1	1
CO5	2	1	3	2	3	1	3	1	2	1	2	1	1	1	1

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - I

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Mathematics & Chemistry)	
Course Code	21U1PHA01	Title	Batch	2021 - 2024
Hrs/Week	5	ALLIED PHYSICS - I	Semester	I
			Credits	5

COURSE OBJECTIVES

1. Different topics such as Properties of Matter which deals with experimental method.
2. Heat which deals with behavior of matter and also use of Low temperature physics.
3. A small introduction about optics and optical devices and also concept of electricity.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge level
CO1	To learn the basic concept of properties of matter and elasticity.	K1, K2, K4
CO2	To study the basic principle of laser and its application.	K1, K2, K3
CO3	Listing the basic ideas and experimental studies of heat.	K1, K2, K4
CO4	Gain fundamental knowledge about optical instruments.	K1, K4
CO5	To study the basic of electricity and its measurements.	K1, K4

UNIT – I: Properties of Matter 12

Elasticity - Three types of elastic modulus - Poisson's ratio – Uniform and Non–uniform bending (Scale and Telescope method) – Torsion pendulum – Theory of rigidity modulus by static torsion – Surface tension and Interfacial tension – Drop weight method.

UNIT – II: Laser and its applications 10

Principle – condition for light amplification – Population Inversion – Threshold Condition – He – Ne laser - CO_2 laser – Ruby Laser – Applications of laser in medicine and industries.

Unit – III: Heat 10

Specific heat – determination of C_p and C_v – Vander walls equation, Critical constant and their determination – Thermal conductivity of bad conductor – Lees disc method – Liquifaction of gases – Joule Thomson Effect – Porous Plug Experiment – Inversion Temperature.

Unit – IV: Optics 14

Introduction – Condition for interference – Fresnel's biprism – Airwedge – Thickness of Wire – Diffraction of light – Fresnel and Fraunhofer diffraction – Polarization – Nicol Prism – Polarizer and Analyzer – Quarter wave plate – Half wave plate – Optical Activity.

Unit – V: Electricity 14

Introduction – Determination of resistance – Potentiometer – Low range Voltmeter and Ammeter calibration – Choke coil – Transformer – Construction – Theory –Energy loss and uses.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. Modern physics – R.Murugesan, S.Chand & Co, Twelth Edition, (2004).
2. Heat and Thermodynamics – BrijLal and Subramaniam, S.Chand and Co., (2004).
3. Brijlal and Subrahmaniyam - Optics, S.Chand & Company (P) Ltd., (1987).
4. Optics and Spectroscopy - R.Murugeshan and Krithika, S.Chand and Co.,(2006).
5. Electricity and Magnetism – BrijLal and Subramaniam, S.Chand and Co.,(2005).

BOOKS FOR REFERENCE:

1. Fundamentals of General Properties of Matter - H.R.Gulati, S.Chand and Co., (2005).
2. Thermal Physics - R.Murugeshan, Kiruthiga sivaprasath, (2004).
3. Modern Physics - R.Murugeshan, (2013).

ONLINE SOURCES:

1. www. khanacademy.org/science/physics/elasticity/surfacetension
2. www. khanacademy.org/science/physics/viscosity/Heat/Optics/Electricity

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	3	3	2	3	3	2	2	2	2	1	1	1	1	1
CO2	3	3	3	2	3	2	1	1	1	3	1	2	1	1	1
CO3	3	3	3	2	3	2	1	2	1	2	2	1	1	1	1
CO4	3	1	3	2	3	2	1	1	2	2	1	2	1	1	1
CO5	3	3	3	1	3	1	1	1	2	1	3	1	1	1	1

3 - Strong; 2 - Medium; 1 - Low

SEMESTER - II

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Mathematics & Chemistry)	
Course Code	21U2PHA02	Title	Batch	2021 – 2024
Hrs/Week	5	ALLIED PHYSICS - II	Semester	II
			Credits	5

COURSE OBJECTIVES

1. Different topics such as Atomic Physics basic idea of structure and atom.
2. Solid state Physics which deals with behavior of crystal structure and different types of Bonding.
3. A small introduction about Basic Electronics and Digital Electronics.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	To learn the basic concept of structure and functions of atoms.	K1, K2, K4
CO2	Understand the properties of nuclei.	K1, K2, K4
CO3	Outline the importance of solid state physics in the modern society.	K1, K2, K4
CO4	To know about the electronic circuits and its operation.	K1, K2
CO5	Understand the application of electronics with mathematical computation.	K1, K2, K3

UNIT – I: Atomic Physics 12

Introduction to atomic physics – Photoelectricity: Photo electric cells — Photo Voltaic cell – Photo conductive cell – Applications of Photo electric cell – Atom model - Bohr's theory and Somerfield theory - Vector atom model - Spatial quantization - Spinning electron - Quantum numbers associated with Vector atom model - Pauli's exclusion principle - Stern- Gerlach experiments.

UNIT - II: Nuclear Physics 10

Introduction - Classification of nuclei - General properties of nucleus - Binding energy - Nuclear stability.

Nuclear models: Liquid drop model - Semi empirical mass formula - Shell model - Ionization chamber - Geiger Muller counter.

UNIT – III: Solid State Physics 10

Introduction - Crystalline and Amorphous solids - Periodic array of atoms - Unit cell – Basis – Lattice – Types - Two dimensional and three dimensional lattices - Lattice planes - Seven crystal systems - Bonding in crystals - Ionic bond - Covalent bond - Metallic bond - Molecular bond - Hydrogen bond.

UNIT – IV: Basic Electronics 14

Semi Conductor Physics – Intrinsic and Extrinsic semi conductor – P type and N type semi conductor - Construction and Characteristics of FET – Low range power pack using two diodes - Operational amplifiers - Inverting Op Amp – Non inverting Op Amp - Inverting summing Amplifier – Non inverting summing amplifier – Differential amplifier – Integrator.

UNIT – V: Digital Electronics 14

Binary, Octal, Hexadecimal number and their inter conversion - Laws of Boolean algebra - Simplification of Boolean expression - DE-MORGANS theorem – NAND/NOR gate as universal building blocks - Half adder - Full adder - Half subtractor - Full subtractor using logic gates - Amplitude modulation.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. Modern physics – R. Murugesan, S. Chand& Co., 12th Edition, (2004).
2. Digital principles and applications – Malvino& Leach, TMH, (2000).
3. Principles of Electronics – V.K. Metha, S. Chand& Co., (2001).
4. Solid state Physics- S. L. Kakani, C. Hemrajani, Sultan Chand& Sons, 4th edition (2005).
5. Solid state Physics - S.O. Pillai, New Age International Publishers, 6th edition, (2011).

BOOKS FOR REFERENCE:

1. Concepts of Nuclear Physics, B. L. Cohen, Tata McGraw Hill, New Delhi,(1988).
2. Atomic and Nuclear Physics by H. Semat and J.R. Albright, Chapman and Hall, (2003).
3. Atomic and Nuclear Physics by S.N. Ghoshal, S. Chand & Co, (2004).

ONLINE SOURCES:

1. www.khanacademy.org/science/physics/elasticity/surface tension
2. www.khanacademy.org/science/physics/viscosity/ Heat/Optics/Electricity

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	3	3	2	3	2	3	1	3	1	2	2	1	1	1
CO2	3	3	3	2	3	3	1	2	1	3	1	3	1	1	1
CO3	3	3	3	2	3	2	1	3	1	2	2	1	1	1	1
CO4	3	3	3	2	3	2	1	1	2	2	1	2	1	1	1
CO5	3	3	3	1	3	1	2	1	2	1	2	1	1	1	1

3 - Strong; 2 - Medium; 1 – Low

SEMESTER - III

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U3PHN01	Title	Batch	2021 - 2024
Hrs/Week	2	NMEC - I: ESSENTIALS OF ELECTRICITY	Semester	III
			Credits	2

COURSE OBJECTIVES

1. To acquire knowledge about Handling and identifying electrical instruments.
2. To know about the principle used in the storage of electricity.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	To learn the basic concepts of electricity.	K1, K2
CO2	To study the basics of unit and measurements of electricity.	K1, K2, K4
CO3	To learn about generation of electricity.	K1, K2
CO4	To impart the knowledge about electric energy storage devices.	K1, K2, K4
CO5	To know the features and operations of domestic electrical appliances.	K1, K2, K4

UNIT – I: Electricity 4

Introduction - Ohms law - Electric charge - Coulomb's law - Principle and types of Resistors and Capacitors.

UNIT – II: Units and Measurements 5

Current – Voltage – Units - Measuring meters: Galvanometer – Voltmeter – Ammeter - Multimeter.

UNIT – III: Generation of Electricity 5

Preference for electricity - Sources of generation of electricity – Conventional - Nuclear Power stations – Non - conventional - Photovoltaic cells.

UNIT – IV: Storage and Conservation of Electricity 4

Primary cells - Daniel cell - Lechlanche cell - Secondary cells - Lead cell – Nickel - Cadmium cell - Rechargeable cell - Conservation of electricity.

UNIT – V: Domestic Electrical Appliances 6

Principle and Operation: Eelectrical bulbs – Fans - Mixer grinder – Refrigerator - Air conditioner – UPS – Stabilizer - Microwave Oven.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. A Text Book of Electrical Technology, Theraja. A.L. Theraja.B.K, S.Chand & Co., (2010).
2. Electricity and Magnetism - N.Nagarathinam and N.Lau, S.Chand & Sons, (2007).

BOOKS FOR REFERENCE:

1. Electricity and Magnetism - R. Murugesan, S. Chand & Co., (2005).
2. Electricity and Magnetism- Brijlal and Subramaniam, S. Chand & Co., (2005).
3. Principles of Electronics - V.K.Mehta, Rohit Mehta, S.Chand & Co, Ltd, (2020)

ONLINE SOURCES:

1. https://www.khanacademy.org/science/ap-physics-1/ap-circuits-topic/current-ap
2. http://nptel.ac.in/cources

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	3	3	1	2	2	2	1	1	1	1	2	1	1	1
CO2	3	3	3	1	2	2	1	2	1	2	1	3	1	1	1
CO3	3	3	3	1	3	2	1	2	1	3	2	1	1	1	1
CO4	3	3	3	1	2	2	1	1	2	2	1	2	1	1	1
CO5	3	3	3	1	1	1	2	1	2	1	2	1	1	1	1

3 - Strong; 2 - Medium; 1 - Low

SEMESTER - IV

Programme Code	B.Sc.,	Programme Title	Bachelor of Science (Physics)	
Course Code	21U4PHN02	Title	Batch	2021 - 2024
Hrs / Week	2	NMEC - II: PHYSICS IN EVERYDAY LIFE	Semester	IV
			Credits	2

COURSE OBJECTIVES

1. Different topics such as Mechanics which deals with principle and working of Machines.
2. Properties of matter which deals with behavior of matter, and also the principle of heat.
3. Introduction about optics and optical devices and also basic concepts of electricity.

COURSE OUTCOMES (CO)

CO Number	CO Statement	Knowledge Level
CO1	Study the basic knowledge about mechanics.	K1, K4
CO2	Understand the fundamentals of properties of matter and sound.	K1, K2
CO3	To know the basic knowledge of heat and its measurements.	K1, K2, K4
CO4	Understand the basic concept of light.	K1, K2
CO5	Acquire basic knowledge about electricity and magnetism.	K1, K3, K4

UNIT – I: Mechanics 4

Motion, Force, Work, Power and Energy - Mass and Weight - Newton’s law of motion - weight of a body in a lift - Gravitation - planetary motion and earth satellites – Communication satellites.

UNIT – II: Properties of Matter& Sound 5

Three states of matter - Binding forces – Archimedes Principle - Applications - Pascal law - Capillary action - Surface Tension – Dimension of Surface Tension - Bernoulli's principle –

Viscosity - Bunsen Burner.

Sound - Reverberation - Acoustics of building – Intensity of sound – Loudness of sound – Noise pollution.

UNIT – III: Heat 5

Definition - Measurement of heat and temperature – types of thermometers - platinum resistance thermometer - Clinical Thermometer - Thermometer applications- Expansion of solid, liquid & gas.

UNIT – IV: Light 5

Reflection – Refraction - Laws of refraction - Reflection through a lens - Image formation by a lens - Effect of silvering one of the refracting surfaces of a lens - determination of focal length of a convex lens by displacement method - Refractive index.

UNIT – V: Electricity and Magnetism 5

Electric power - Electrical safety - electromagnetic induction - Faraday's Law - Lenz Law – Transformers.

Measurement of Resistance: Carey Foster's Bridge – Potentiometer - Properties of dia, para, ferromagnetism.

Power point presentation, Quiz and Assignment

BOOKS FOR STUDY:

1. A Text book of Physics - D.C. Agarwal., A.H.Wheeler Company Ltd, (1998).
2. Properties of Matter & Acoustics, R. Murugesan. S. Chand, (2005).
3. A text book in Electrical technology – B.L.Teraja, S.Chand & Co., New Delhi, (2006).
4. Text book of Optics, N.Subramaniyan, S.Chand, (2004).
5. Electricity and Magnetism, Brijlal and Subramaniam, S.Chand & Co., (2008).

BOOK FOR REFERENCE:

1. Modern Physics - Murugesan R. & Sivaprasath Kiruthiga, S.Chand, (2017).
2. Heat and Thermodynamics - Brij lal, Dr.N.Subramaniyam, P.S.Hemne, S.Chand, (2008).
3. Principles of Electronics - V.K.Mehta, Rohit Mehta, S.Chand & Co, Ltd, (2020).

ONLINE SOURCES:

1. https://www.khanacademy.org/science/physics/forces-newtons-laws
2. http://nptel.ac.in/cources

MAPPING WITH PROGRAMME OUTCOMES

PO / CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	3	1	3	3	2	3	2	2	1	1	2	1	1
CO2	3	3	3	1	3	1	1	2	2	2	2	2	1	1	1
CO3	3	3	3	3	3	2	2	2	2	3	2	1	1	1	2
CO4	3	3	3	1	3	2	1	2	2	1	1	1	2	2	1
CO5	3	2	3	2	3	2	1	1	2	1	1	1	1	1	2

3 - Strong; 2 - Medium; 1 – Low

SEMESTER – II

CORE PRACTICALS – I

Credit: 4

Max. Hours: 60

PAPER CODE: 21U2PHCP01

Any 12 Experiments

1. Young's modulus - Uniform bending – Scale & telescope method.
2. Torsion pendulum - Rigidity modulus - Dynamic method.
3. Surface tension & interfacial surface tension - Drop weight method.
4. Sonometer - Frequency of a fork.
5. Spectrometer - Refractive index of the prism.
6. Potentiometer - Calibration of low range voltmeter.
7. Compound Pendulum.
8. Lee's Disc.
9. Field along the axis of a coil - Deflection magnetometer.
10. Airwedge - thickness of a wire using travelling microscope.
11. Verification of basic gates NOT, AND, OR, NAND and NOR.
12. NAND & NOR as universal gates.
13. Zener diode - Voltage regulation.
14. Low range power pack by using two diodes - Voltage regulation.
15. Focal length of concave lens.

BOOK FOR REFERNCES:

1. Practical Physics – C. C. Ouseph, U. J. Rao, V. Vjiayendran, 1st Edition, (2015).
2. Advanced Practical Physics, S.P Singh and Pragati Prakashan, 17th Edition, Vol – I, II.
3. P. R. Sasi Kumar, Practical Physics – PHI, (2011).

SEMESTER – IV

CORE PRACTICAL - II

Credits: 4

Max. Hours: 36

PAPER CODE: 21U4PHCP02

Any 12 Experiments

1. Young's modulus – Uniform bending – Pin and Microscope.
2. Torsion Pendulum – MI and Rigidity modulus – Symmetrical masses.
3. Static Torsion – Rigidity Modulus.
4. Joule's calorimeter – Specific heat capacity of a liquid.
5. Newton's law of cooling – Spherical calorimeter.
6. Spectrometer – Grating – Normal incidence – Wavelength.
7. Newton's rings – Radius of curvature of lens.
8. Potentiometer – Ammeter calibration.
9. Potentiometer – Resistance and Specific resistance.
10. Carey Foster's Bridge – Resistance and Specific resistance.
11. Deflection magnetometer – Tan C.
12. Operational amplifier - Inverting and Non-Inverting amplifier.
13. OP-AMP – Adder and Subtractor.
14. Half Adder and Full Adder.
15. Half Subtractor and Full Subtractor.

BOOK FOR REFERNCES:

1. Practical Physics – C. C. Ouseph, U. J. Rao, V. Vjiayendran, 1st Edition, (2015).
2. Advanced Practical Physics, S.P Singh and Pragati Prakashan, 17th Edition,Vol – I, II.
3. P. R. Sasi Kumar, Practical Physics – PHI, (2011).

SEMESTER – VI

CORE PRACTICAL – III

Credit: 4

Max. Hours: 36

PAPER CODE: 21U6PHCP03

Any 12 Experiments

1. Cantilever –Young's modulus mirror and telescope.
2. Deflection magnetometer – M and B_H – TAN C position.
3. Comparison of mutual inductance – BG.
4. Spectrometer – i-i' curve.
5. Spectrometer small angled prism.
6. Potentiometer – Calibration of high range voltmeter.
7. Lee's disc – Thermal conductivity of a bad conductor.
8. Co-efficient of viscosity-under graduated Burette - Radius by Mercury pellet method.
9. FET - Characteristics.
10. UJT - Characteristics.
11. Hartley oscillator.
12. Colpitt's oscillator.
13. SCR – Characterisitics.
14. Microprocessor 8085 – Addition and Subtraction.
15. Microprocessor 8085 – Multiplication and Division.

BOOK FOR REFERNCES:

1. Practical Physics – C. C. Ouseph, U. J. Rao, V. Vjiayendran, 1st Edition, (2015).
2. Advanced Practical Physics, S.P Singh and Pragati Prakashan, 17th Edition, Vol – I, II.
3. P. R. Sasi Kumar, Practical Physics – PHI, (2011).

SEMESTER – VI

CORE PRACTICAL – IV

Credit: 4

Max. Hours: 36

PAPER CODE: 21U6PHCP04

Any 12 Experiments

1. Koenig's method – Uniform Bending.
2. Koenig's method – Non-Uniform Bending.
3. Cantilever – Dynamic method.
4. Bifilar pendulum – Parallel threads.
5. Newton's rings – Refractive index of liquid.
6. Spectrometer - Dispersive power of a Grating.
7. Spectrometer – Cauchy's constant.
8. Potentiometer EMF of a thermocouple.
9. Field along the axis of coil – Vibration Magnetometer.
10. Carey fosters bridge – Temperature coefficient of resistance.
11. Astable multivibrator using 555 timers.
12. Monostable multivibrator using 555 timers.
13. Operational amplifier: Integrator and differentiator.
14. V-I characteristics of LED.
15. RS Flip-Flop using NAND and NOR gates.

BOOK FOR REFERNCES:

1. Practical Physics – C. C. Ouseph, U. J. Rao, V. Vjiayendran, 1st Edition, (2015).
2. Advanced Practical Physics, S.P Singh, and Pragati Prakashan, 17th Edition, Vol – I, II.
3. P. R. Sasi Kumar, Practical Physics – PHI, (2011).

ALLIED PHYSICS – PRACTICALS

Credit: 3

Max. Hours: 60

Paper Code: 21U2PHAP01

Any 12 Experiments:

1. Young's Modulus – Non uniform bending - Scale and telescope.
2. Young's Modulus – Uniform bending - Scale and telescope.
3. Torsion Pendulum - Rigidity modulus.
4. Surface Tension and interfacial surface tension - Drop weight method.
5. Sonometer - Frequency of fork.
6. Air wedge - Thickness of wire.
7. Focal length of convex lens.
8. Spectrometer - μ of the prism.
9. Potentiometer - Low range voltmeter calibration.
10. Potentiometer - Low range ammeter calibration.
11. Zener diode - Characteristics.
12. Low range power pack - Using two diodes.
13. Verification of basic gates NOT, AND & OR.
14. Field along the axis of the coil - B_H.
15. Lee's Disc - Thermal conductivity.

BOOK FOR REFERNCES:

1. Practical Physics – C. C. Ouseph, U. J. Rao, V. Vjiayendran, 1st Edition, (2015).
2. Advanced Practical Physics, S.P Singh and Pragati Prakashan, 17th Edition, Vol – I, II.
3. P. R. Sasi Kumar, Practical Physics – PHI, (2011).