B.Sc. Physics

Curriculum and Syllabus

Effective from the Academic year
2018 - 2019

Department of Physics
School of Basic Sciences

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To provide the students with broad and balanced knowledge and understanding of physical concepts, principles and theories of Physics.

PEO2: To learn, design and perform experiments in the labs to demonstrate the concepts, principles and theories learned in the classrooms.

PEO3: To understand the basics of Physics and it's ever evolving nature of applications in explaining the entire observed natural phenomenon as well as predicting the future applications to the new phenomenon with a global perspective.

PEO4: To promote the academic input of students by organizing workshops, seminars, conferences and guest lectures.

PEO5: To demonstrate Physics-related technological skills that are relevant to Physics-related job trades and employment opportunities.

PROGRAM OUTCOMES (POs)

PO1: **Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2: **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO3: **Social Interaction**: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO4: **Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO5: **Ethics**: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO6: **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

PO7: **Self-directed and Life-long Learning**: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1: Graduates will be able to demonstrate the ability to use skills in Physics and its related fields of technology to formulate and address Physics related problems.

PSO2: Graduates will acquire methodological skills and can enroll in different disciplines such asScience and Engineering, Education, Business, Banking, Research and development, teaching and government/public service.

PSO3: Graduates will be able to synthesize the acquired knowledge, understand and experience for a better and improved comprehension of the physical problems in nature and to create new skills and tools for their possible solutions.

PSO4: Graduates will emphasize the discipline of Physics to be the most important branch of science for pursuing the interdisciplinary and multidisciplinary higher education and/or research in interdisciplinary and multidisciplinary areas.

PSO5: Graduates will emphasize the importance of Physics as the most important discipline for sustaining the existing industries and establishing new ones to create job opportunities at all levels of employment.

B. Sc. Physics Curriculum
CHOICE BASED CREDIT SYSTEM
Effective from the Academic Year 2018 - 2019

Total number of Credit: 140

Category	Code No.	Course	Hours per week			Credits
			Lecture	Tutorial	Practical	
SEMESTER I						
LANG		Language–I (Tamil, Hindi & French)	5	0	0	5
ENG		English – I	5	0	0	5
CORE		Properties of Matter & Acoustics	4	0	0	4
CORE		Mechanics	4	0	0	4
CORE		Mathematics – I	4	0	0	4
CORE		Practical Physics – I	0	0	4	2
			22	**0**	**4**	**24**
SEMESTER II						
LANG	18LTA002/ 18LHIN21/ 18LFR002	Language–II (Tamil, Hindi & French)	5	0	0	5
ENG	18LEN002	English–II	5	0	0	5
CORE		Thermal Physics	4	0	0	4
CORE		Optics	4	0	0	4
CORE		Mathematics - II	4	0	0	4
CORE		Practical Physics - II	0	0	4	2
			22	**0**	**4**	**24**
SEMESTER III						
LANG		Language–III (Tamil, Hindi & French)	5	0	0	5
ENG		English–III	5	0	0	5
CORE		Electricity & Magnetism	4	0	0	4
CORE		Chemistry - I	4	0	0	4
CORE		Practical Physics – III	0	0	4	2
CORE		Chemistry Practical – I	0	0	4	2
SEC		Skill Enhancement Course - I	2	0	0	2
			20	**0**	**8**	**24**

Category	Code No.	Course	Hours per week			Credits
			Lecture	Tutorial	Practical	
SEMESTER IV						
LANG	15LTA004/ 18LHIN41/ 15LFR004	Language – IV (Tamil, Hindi & French)	5	0	0	5
ENG		English – IV	5	0	0	5
CORE		Atomic Physics	4	0	0	4
CORE		Chemistry – II	4	0	0	4
CORE		Practical Physics – IV	0	0	4	2
CORE		Chemistry Practical – II	0	0	4	2
AECC		Environmental Studies	2	0	0	2
SEC		Skill Enhancement Course - II	2	0	0	2
			22	**0**	**8**	**26**
SEMESTER V						
DSE		Discipline Specific Elective – I	5	0	0	5
DSE		Discipline Specific Elective – II	5	0	0	5
DSE		Discipline Specific Elective – III	5	0	0	5
DSE		Discipline Specific Elective Practical – I	0	0	4	2
GE		Generic Elective – I	2	0	0	2
SEC		Skill Enhancement Course – III	2	0	0	2
			19	**0**	**4**	**21**
SEMESTER VI						
DSE		Discipline Specific Elective – IV	5	0	0	5
DSE		Discipline Specific Elective – V	4	0	0	4
DSE		Discipline Specific Elective Practical – II	0	0	4	2
GE		Generic Elective – II	2	0	0	2
SEC/VAC		Value Added Course	2	0	0	2
DE		Project Work	0	0	12	6
			13	**0**	**16**	**21**
						140

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES

B.Sc., DEGREE COURSE IN PHYSICS

SCHEME OF EXAMINATION

SEMESTER I

Category	Code No.	Course	Marks			Exam duration	
			Internal	External	Total	Theory	Practical
LANG		Language–I (Tamil, Hindi & French)	40	60	100	3	0
ENG		English–I	40	60	100	3	0
CORE		Properties of Matter & Acoustics	40	60	100	3	0
CORE		Mechanics	40	60	100	3	0
CORE		Mathematics - I	40	60	100	3	0
CORE		Practical Physics - I	40	60	100	0	3

SEMESTER II

Category	Code No.	Course	Marks			Exam duration	
			Internal	External	Total	Theory	Practical
LANG		Language–II (Tamil, Hindi & French)	40	60	100	3	0
ENG		English–II	40	60	100	3	0
CORE		Thermal Physics	40	60	100	3	0
CORE		Optics	40	60	100	3	0
CORE		Mathematics - II	40	60	100	3	0
CORE		Practical Physics - II	40	60	100	0	3

SEMESTER III

Category	Code No.	Course	Marks			Exam duration	
			Internal	External	Total	Theory	Practical
LANG		Language–III (Tamil, Hindi & French)	40	60	100	3	0
ENG		English–III	40	60	100	3	0
CORE		Electricity & Magnetism	40	60	100	3	0
CORE		Chemistry - I	40	60	100	3	0
CORE		Practical Physics – III	40	60	100	0	3
CORE		Chemistry Practical – I	40	60	100	0	3
SEC		Skill Enhancement Course - I	40	60	100	3	0

SEMESTER IV

Category	Code No.	Course	Marks			Exam duration	
			Internal	External	Total	Theory	Practical
LANG		Language–IV (Tamil, Hindi & French)	40	60	100	3	0
ENG		English–IV	40	60	100	3	0
CORE		Atomic Physics	40	60	100	3	0
CORE		Chemistry – II	40	60	100	3	0
CORE		Practical Physics – IV	40	60	100	0	3
CORE		Chemistry Practical – II	40	60	100	0	3
AECC		Environmental Studies	40	60	100	3	0
SEC		Skill Enhancement Course - II	40	60	100	3	0

SEMESTER V

Category	Code No.	Course	Marks			Exam duration	
			Internal	External	Total	Theory	Practical
DSE		Discipline Specific Elective – I	40	60	100	3	0
DSE		Discipline Specific Elective – II	40	60	100	3	0
DSE		Discipline Specific Elective – III	40	60	100	3	0
DSE		Discipline Specific Elective Practical – I	40	60	100	0	3
GE		Generic Elective – I	40	60	100	3	0
SEC		Skill Enhancement Course – III	40	60	100	0	3
			40	60	100	3	0

SEMESTER VI

Category	Code No.	Course	Marks			Exam duration	
			Internal	External	Total	Theory	Practical
DSE		Discipline Specific Elective – IV	40	60	100	3	0
DSE		Discipline Specific Elective – V	40	60	100	3	0
DSE		Discipline Specific Elective Practical – II	40	60	100	0	3
GE		Generic Elective – II	40	60	100	3	0
SEC/VAC		Value Added Course	40	60	100	3	0
DE		Project Work	40	60	100	0	3

LIST OF DISCIPLINESPECIFIC ELECTIVE COURSES (DSE)

S. No.	Code	Courses
1.		Analog and Digital Electronics
2		Laser Physics & Spectroscopy
3		Nuclear & Particle Physics
4		Solid State Physics
5		Nanomaterials & Applications
6		Laser Physics
7		Solar Technology
8		Energy Physics
		Dissertation

LIST OF GENERIC ELECTIVE COURSES (GEC)

S. No.	Code	Courses
1		Basic Physics
2		Everyday Physics
3		Electrical and Electronic Appliances
4		Renewable Energy Sources
5		Physics Workshop Skills

LIST OF ABILITY ENHANCEMENT COMPULSARY COURSES (AECC)

S. No.	Code	Courses
1		Environmental Studies

LIST OF SKILL ENHANCEMENT COURSES (SEC)

S. No.	Code	Courses
1		Soft Skill – I
2		Soft Skill - II
3		National ServiceScheme–I
4		National ServiceScheme–II
5		National ServiceScheme–III
6		Electrical and Electronic Appliances
7		Physics Workshop Skills

SYLLABUS
CORE COURSES

	PROPERTIES OF MATTER & ACCOUSTICS	L	T	P	Credits
		4	0	0	4

Course Objective: To make the students to understand, the different kinds of moduli via experimental methods; surface tension for liquids; wave phenomena, in general and sound wave in particular; ultrasonics and acoustics.

UNIT –I   Elasticity   9
Hooke's law – Stress – strain diagram – Elastic Moduli, three types of elastic Moduli– Relation between elastic constants – Poisson's Ratio – Expression for Poisson's ratio in terms of elastic constants – Work done in stretching and work done in twisting a wire – Determination of Rigidity modulus by static torsion - Torsional pendulum - Determination of Rigidity modulus and moment of inertia.

UNIT – II   Bending of Beams   9
Cantilever – expression for bending moment – expression for depression – cantilever oscillations – Expression for time period - Experiment to find Young's modulus - uniform - non-uniform bending - theory – experiment using pin and microscope method - Experiment to determine Young's modulus using mirror and telescope.

UNIT – III   Surface Tension   9
Surface tension – Formation of liquid drops - Excess of pressure inside a liquid drop and inside a soap bubble - Experimental study of Surface tension - Drop weight method of determining surface tension and interfacial surface tension – Capillary rise - Angle of contact – Determination of surface tension by capillary rise method.

UNIT – IV   Viscosity   9
Streamlined motion – Turbulent motion – Coefficient of viscosity and its dimension – Rate of flow of liquid in a capillary tube – Poiseuilles' formula – Experimental determination – Stokes Method and experimental determination – Effect of temperature on viscosity.

UNIT – V   Acoustics   9
Music and noise – Characteristics of musical sound, quality of tone, consonance and dissonance – decibel – noise pollution. Acoustics of buildings - Reverberation - Reverberation time – Sabine's formula derivation – measurement of reverberation time – absorption coefficient – acoustical design of buildings– Ultrasonics – production, properties and applications.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Understand the basic concepts of elastic moduli and their relation.
CO2:   Illustrate the uniform and non-uniform bending to determine Young's modulus.
CO3:   Discuss the important concepts in surface tension and their experimental procedure.
CO4:   Demonstrate the rate of flow of liquid in a capillary tube.
CO5:   Understand different concepts in acoustics and apply it in building acoustics.

Text Books
1. R. Murugesan - Properties of Matter, S. Chand & Co, Delhi, 1994.
2. D.S. Mathur–Elements of Properties of Matter, S. Chand & Co, Delhi, 2006.
3. Brij Lal &Subramaniam–A Text book of Sound, Second Edition, Vikas Publishing, Delhi, 2008.

References
1. Resnick and Halliday - Physics, Volume – I & II, Wiley and Sons inc, Sixth edition.
2. C. J. Smith - General Properties of Matter, Orient & Longman Publishers, 1960.

	MECHANICS	**L**	**T**	**P**	**Credits**
		4	**0**	**0**	**4**

Course Objective: To have clear knowledge of mechanics so as to enable them to understand the other branches of Physics especially the mechanics of microscopic bodies, Quantum mechanics.

UNIT-I　　　Laws of Motion　　　　　　　　　　　　　　　　　　　　　9

Newton's law of motion – Force – Mass – Momentum and Impulse, Law of Conservation of Linear Momentum – Collision – Elastic and Inelastic collision – Newton's law of impact - Coefficient of restitution – Impact of moving sphere on a fixed plane – Direct and Oblique impact of moving two smooth spheres – Calculation of final velocities – Loss of Kinetic energy – Projectile motion – Frictional forces – Conservation of Momentum in a system of particles.

UNIT-II　　　Dynamics of Rigid Bodies　　　　　　　　　　　　　　9

Moment of Inertia - Angular Momentum - Torque - Conservation of angular momentum - Kinetic energy of rotating body - Theory of Compound Pendulum - determination of g and k - Centre of Mass - Velocity and acceleration - M.I. of a diatomic molecule.

UNIT-III　　　Gravitation　　　　　　　　　　　　　　　　　　　　　9

Centre of Gravity: Center of Gravity of a solid and hollow hemisphere, solid tetrahedron - Newton's Law of Gravitation- Determination of mass and Density of earth. Determination of 'G' by Boy's Method – Kepler's Laws of Planetary Motion - Newton's Law from Kepler's Law – Escape Velocity - Motion of Rocket - Orbital Velocity – Geo-stationary Orbit and its applications.

Unit – IV　　　Hydrodynamics　　　　　　　　　　　　　　　　　　9

Centre of pressure - Centre of pressure of a rectangular lamina and triangular lamina. Equation of continuity of flow – Euler's equation for unidirectional flow – Torricelli's theorem – Bernouli's theorem - Venturimeter – Pitot tube.

UNIT-V　　　Relativity　　　　　　　　　　　　　　　　　　　　　　9

Frames of references - Michelson-Morley experiment - significance of negative result - postulates of special theory of relativity - Lorentz transformation equations - Length contraction - Time dilation - Law of addition of velocities – Mass energy equivalence – Basic ideas of general theory of relativity.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,

CO1:　Understand the basic concepts about mechanics of microscopic bodies.
CO2:　Demonstrate the knowledge about the dynamics of rigid bodies.
CO3:　Understand the applications of gravitational laws for solids.
CO4:　Identify the centre of pressure of a rectangular and triangular lamina.
CO5:　Apply the concepts of special theory of relativity in various fields of physics and Engineering.

Text Books
1. Narayanamoorthy - Mechanics Part I and II, National Publishing Company.
2. D. S. Mathur– Mechanics, II Edition, S. Chand and Co, 2001.
3. R. Murugeshan - Mechanics and Mathematical Methods, 1st Edition, S. Chand and Co, 1996.

References
1. R.P. Feynman, R.B. Leighton and M. Sands - The Feynman Lectures on Physics, Vols. 1, 2 and 3, Narosa, New Delhi 1998.
2. D. Halliday, R. Resnick and J. Walker - Fundamentals of Physics, 6th Edition, Wiley, New York, 2001.

	MATHEMATICS - I	L	T	P	Credits
		4	0	0	4

Course Objective: To impart the knowledge of Matrices, Algebra, Differential calculus and Trigonometry. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I   Matrices   9
Introduction-Basic Operations-Symmetric-skew symmetric-Hermitian-Skew Hermitian –Unitary-orthogonal-Inverse of a matrix -Solution of linear system (Cramer's rule)- Finding the Eigen roots and Eigen vectors of a matrix-Cayley Hamilton theorem (without proof)

UNIT II   Algebra   9
Partial fractions: Binomial, exponential and logarithmic series (without proof), summation and approximation problems.

UNIT III   Theory of Equations   9
Polynomial equations with real coefficients, irrational roots, complex roots, symmetric functions of roots, Transformation of equation by increasing or decreasing roots by a constant, reciprocal equations, Newton's method to find the root approximately.

UNIT IV   Differential calculus   9
Differentiation – Successive differentiation – Partial differentiation – Maxima and Minima of functions of two variables.

UNIT V   Trigonometry   9
Introduction – Angles – Expansions of $\sin n\theta$ $\cos n\theta$,$\tan n\theta$. Expansion of $\sin\theta$, $\cos\theta$, $\tan\theta$, in terms of θ-Simple problems.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1: Solve that the following are Unitary, orthogonal, Inverse of a matrix, Solution of linear system (Cramer's rule).
CO2: Solve Newton's method to find the root approximately.
CO3: Solve the Polynomial equations with real coefficients, irrational roots, complex roots, symmetric functions of roots.
CO4: Find the Maxima and Minima of functions of two variables.
CO5: Find the Expansion of $\sin\theta$, $\cos\theta$, $\tan\theta$, interms of θSimple problems.

Text Books
1. P.R. Vittal, Allied Mathematics, Margham Publications, 4th Edition 2009.
2. A. Singaravelu, Allied Mathematics, Meenakshi Agency, 2007.

	PHYSICS PRACTICAL – I	L	T	P	Credits
		0	0	4	2

Any 10 Experiments

1. Young's modulus- uniform bending (pin & microscope)
2. Young's modulus- Non-uniform bending (pin & microscope)
3. Rigidity modulus- Torsion pendulum
4. Surface tension – capillary rise method
5. Viscosity of liquid- Poiseuille's method
6. Viscosity of liquid- Stoke's method.
7. Sonometer - Frequency of tuning fork
8. Compound pendulum- To determine 'g'
9. Hook's Law – To study the motion of a spring and calculate (a) Spring Constant, (b) g.
10. To determine the Moment of Inertia of a Flywheel
11. To determine the Elastic Constants of a Wire by Searle's method

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Calculate the Young's modulus of the material.
CO2: Estimate the parameters associated with torsional oscillation.
CO3: Analyze the coefficient of viscosity at different pressure head.
CO4: Measure the acceleration due to gravity.
CO5: Determine the moment of inertia of a Flywheel.

Text Book

1. C. C. Ouseph, U. J. Rao, V. Vjiayendran, Practical Physics,1st Edition, 2015

	THERMAL PHYSICS	L	T	P	Credits
		4	0	0	4

Course Objective: To understand the concept of heat, transmission of heat, kinetic theory of gases and laws of thermodynamics

UNIT I   Thermometry and Calorimetry   9
Platinum resistance thermometer – Calendar and Griffith's bridge – Thermistor – Specific heat capacity – Specific heat capacity of solids – Method of mixtures – Radiation correction - Dulong and Petit's law – Specific heat capacity of liquid – Newton's law of cooling – Callendar & Barne's methods – Specific heat of gases – Two specific heat capacities of a gas - Determination of Cv by Joly's Differential Steam Calorimeter - determination of Cp by Regnault's method.

UNIT II   Conduction & Radiation   9
Definition of thermal conductivity – thermal conductivity of bad conductor – Lee's disc method-radial flow of heat-thermal conductivity of rubber.
Radiation – Black body radiation – Wien's law, Rayleigh-Jean's law-Planck's quantum theory of radiation - Planck's law – Stefan's law-Deduction of Newton's law of cooling from Stefan's law – solar constant (Definition only).
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UNIT III   Kinetic Theory of Gases   9
Maxwell's law of distribution of molecular velocities – Experimental verification of molecular velocities – Mean free path of gaseous molecules – Transport phenomena – Diffusion of gases – Viscosity and thermal conduction of gases – Vander Waals equation of state – Determination of Vander Waals constant – Comparison of Vander Waals equation with Andrews experiment - Relation between Vander Waals constant and critical constants.

UNIT IV   Low Temperature   9
Joule – Thomson's effect – Porous plug experiment – Liquefaction of gases – Linde's method – Adiabatic demagnetization – Properties of He^1 and He^2 – Practical applications of low temperature – Refrigeration and air conditioning.

UNIT V   Laws of Thermodynamics   9
Zeroth and first law of thermodynamics – Reversible and irreversible process – Second law of thermodynamics – Carnot's engine – Derivation of efficiency – Carnot's theorem. Entropy – Change of entropy in reversible and irreversible processes– Temperature – entropy diagram (T.S) – Thermodynamic Scale of temperature – Third law of thermodynamics.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Understand the concepts of specific heat capacities of solids, liquids and gases.
CO2:   Identify the good and bad conductors and concepts of blackbody radiation and their applications.
CO3:   Apply the fundamental principles of diffusion of gases and its practical problems related to Vander Waals equation of state.
CO4:   Apply the concepts of Liquefaction of gases in the low temperature and its practical applications.
CO5:   Develop the design and fabrication of various Heat engines and improve its efficiency.

Text Books
1.   Brijilal and Subramininan, Heat & Thermodynamics, S. Chand &Co.1999.

References
1.   R. Murugesan, Thermal Physics- S. Chand & Co, 2015.
2.   D.S. Mathur, Heat and Thermodynamics, S. Chand and Company, 2006.

OPTICS	L	T	P	Credits
	4	0	0	4

Course Objective: To understand the concepts of optics, to study interference and diffraction of light and to learn the techniques of optical instruments

UNIT I   Geometrical Optics   9
Spherical aberration in lenses - methods of minimizing spherical aberration and conditions – Coma - Chromatic aberration in lenses - Condition for achromatism of two thin lenses (in and out of contact) - Astigmatism - Dispersion produced by a thin prism - Combination of prisms to produce - Dispersion without deviation - Deviation without dispersion.

UNIT II   Interference   9
Air wedge – Newton's rings – Haidinger's fringes – Brewster's fringes – Michelson Interferometer and its applications – Fabry- Perot Interferometer – Interference filter – Stationary waves in light – Colour photography (qualitatively) – Holography- Construction and reconstruction of a hologram – Applications.

UNIT III   Diffraction   9
Fresnel's diffraction – Diffraction at a circular aperture and narrow wire – Fraunhofer diffraction - single slit – Double slit (Theory)– Diffraction pattern – Grating (theory) – Determination of wavelengths using grating - Rayleigh's criterion of resolution- Resolving power of a Telescope – Dispersive power and resolving power of a grating - Difference between resolving power and Dispersive power

UNIT IV   Polarization   9
Double refraction - Nicol prism – Nicol prism as an analyzer and polarizer – Huygens's explanation of Double refraction in uniaxial crystals – Double Image polarizing prisms – Elliptical and Circularly polarized light – Production and detection – Quarter wave and half wave plates – Babinet's compensator – Optical activity – Laurent's Half shade polarimeter.

UNIT V   Optical Instruments   9
Microscopes – Simple Microscope (Magnifying glass) – Compound Microscope – Ultra-Microscope – Eyepieces - Huygen's Eyepiece - Ramsden's Eyepiece — Comparison of Eyepieces – Telescope – Refracting astronomical telescope – Abbe Refractometer – Pulfrichrefractometer - Photographic Camera – Prism binocular

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Understand the various types of aberrations in lens**.**
CO2:   Understand the application of interference in interferometer.
CO3:   Understand the concept of diffraction and its application in finding the wavelength.
CO4:   Identify circular and elliptical polarization and methods to generate it.
CO5:   Illustrate working principle of various optical instruments.

Text Book
1. Subramaniam N &Brij Lal, Optics, S Chand & Co. Pvt. Ltd., New Delhi, 2004
2. Murugesan, Optics and Spectroscopy, S Chand & Co. Pvt. Ltd., New Delhi, 2010.

References
1. Eugene Hecht, Optics, 4th Edition, Addison Wesley, 2002.
2. Okan K. Ersoy, Diffraction, Fourier Optics and Imaging, John Wiley & Sons,2007
3. Optics by Khanna D R & Gulati H R, R Chand & Co. Pvt. Ltd., New Delhi, 1979
4. Singh & Agarwal, Optics and Atomic Physics, PragatiPrakashan Meerut, Nineth edition, 2002.

	MATHEMATICS - II	L	T	P	Credits
		4	0	0	4

Course Objective: To impart the knowledge of Integral calculus, Differential Equations, Fourier Series and Laplace transform. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I   Integral Calculus   9
Integral calculus: Integration – Definite integrals – Bernoulli's formula -Reduction formula for $\int \sin^n x\, dx, \int \cos^n x\, dx, \int \tan^n x\, dx, \int x^n e^{ax}\, dx$.

UNIT II   Ordinary Differential Equations   9
          Ordinary differential equations: First order of higher degree equations – Second order and non-homogenous linear differential equations with constant coefficient – Second order linear differential equations with variable coefficients.

UNIT III   Partial Differential Equations   9
Formation of partial differential equations by eliminating arbitrary constants and arbitrary function- Solutions of standard types of first order equations- f(p, q) = 0; f(x, p, q) = 0, f(y, p, q) = 0, f(z, p, q) = 0, z = px +qy +f(p, q) - Lagrange method of solving linear partial differential equation Pp +Qq = R.

UNIT V Laplace Transform   9
Laplace transform: Definition, Laplace transform of basic trigonometric, exponential and algebraic functions - Inverse Laplace transform- Solving differential equation of second order with constant coefficients using Laplace transform.

UNIT V Fourier Series   9
Fourier series of periodic functions on the interval [c, c+2π] –Even and Odd functions- Half range series.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Evaluate definite integrals Bernoulli's formula.
CO2:   Solve First order of higher degree equations, Second order and non-homogenous linear differential equations with constant coefficient.
CO3:   Solve Lagrange method of linear partial differential equation Pp+Qq=R.
CO4:   Evaluate Laplace transform of basic trigonometric, exponential and algebraic functions.
CO5:   Determine Even and Odd functions, half range series.

Text Books
1. P. Kandaswamy and K.Thilagavathy, Allied Mathematics paper II, 2nd Semester, S. Chand Publishing Pvt. Ltd. 1st Edition, 2004.

Reference Books
1. P.R. Vittal, Allied Mathematics, Margham Publications, 4th Edition 2009.
2. A. Singaravelu, Allied Mathematics, Meenakshi Agency, 2007.

PHYSICS PRACTICAL C - II	L	T	P	Credits
	0	0	4	2

Any 10 Experiments

1. Lee's Disc method – Thermal conductivity of bad conductor
2. Joule's Calorimeter - determination of Specific heat capacity of liquid
3. Verification of Boyle's law
4. Newton's law of cooling
5. Specific heat capacity- Mixture of Solid and Liquid
6. Spectrometer – Grating (N & λ)
7. Spectrometer – Dispersive power of prism
8. Air wedge
9. Newton's Ring-Sodium lamp (Microscope)
10. Convex and convex lens – f, R and m
11. Solar constant.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Examine the thermal conductivity of bad conductor using Lee's disc method.
CO2: Calculate the wavelengths of different spectral line using spectrometer grating.
CO3: Appraise the refractive index dispersive power of the prism using spectrometer.
CO4: Calculate the specific heat capacity of a given liquid.
CO5: Measure the focal length of convex and concave lenses by UV method.

Text Book

1. C. C. Ouseph, U. J. Rao, V. Vjiayendran, Practical Physics, 1st Edition, 2015.

	ELECTRICITY & MAGNETISM	L	T	P	Credits
		4	0	0	4

Course Objective: To understand the general concepts in Electrostatics, to educate scientifically the principles of magnetism and apply the physics concepts in solving problems.

UNIT-I   Electrostatics   9
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 spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charges.

UNIT II   Chemical Effects of Electric Current   9
Faraday's laws of Electrolysis - Ionic velocities and mobilities. Calculation and experimental determination of ionic mobilities - transport number. Thermoelectricity- Peltier effect - Experimental determination of Peltier coefficient - Thomson coefficient – experimental determination of Thomson coefficient - application of thermodynamics to a thermocouple and connected relations - thermoelectric diagram and uses

UNIT-III   DC and AC Circuits   9
DC Circuits: Growth and decay of current in a circuit containing resistance and inductance - growth and decay of charge in a circuit containing resistance and capacitor – growth and decay of charge in an LCR circuit - condition for the discharge to be oscillatory – frequency of oscillation - network analysis - Thevenin and Norton's Theorems.
AC Circuits: AC Voltage and current - Power factor and current values in and AC circuit containing LCR circuit - series and Parallel resonant circuits - AC motors - single phase, three phase - star and delta connections - electric fuses - circuit breakers.

UNIT IV   Magnetic effect of electric current   9
Biot and Savart's law - magnetic field intensity due to a solenoid carrying current – effect of iron core in a solenoid - Helmholtz galvanometer - moving coil ballistic galvanometer – theory - damping correction - determination of the absolute capacity of a condenser using B.G.

UNIT V   Electromagnetic Induction and its applications   9
Faraday's laws of electromagnetic induction - inductor and inductance - determination of self-inductance of a coil using Anderson method - mutual inductance – experimental determination of absolute mutual inductance - coefficient of coupling - Earth inductor - uses of earth inductor – Ballistic Galvanometer (B.G) - calibration of B.G. - Induction coil and its uses.

TOTAL HOURS: 45
COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Understand the basic concepts of electrostatics and its applications.
CO2:   Apply the concepts of chemical effect in the thermoelectricity and its experimental techniques.
CO3:   Identify the various concepts involved in AC and DC circuits.
CO4:   Understand the magnetic effect of electric current used in various galvanometer and its instrumentation
          techniques.
CO5:   Develop the design, fabrication and characterization techniques for the self and mutual inductances.
Text Books
   1. Brijlal and N. Subrahmanyam, A Text Book of Electricity and Magnetism, RatanPrakasanMandir Educational & University Publishers, New Deihi,2000.
   2. R. Murugeshan, Electricity and Magnetism, 7th Edition, S. Chand & Company Pvt. Ltd. 2008
   3. D. L. Sehgal, K. L. Chopra and N. K. Sehgal, Electricity and Magnetism, S. Chand & Sons. New Delhi. 1996.
References
   1. Griffth D.J, Introduction to Electrodynamics, 4th Edition, Prentice Hall of India, 2012.
   2. NavinaWadhani, Electricity and Magnetism, Prentice Hall of India, 2012.

	GENERAL CHEMISTRY - I	L	T	P	Credits
		4	0	0	4

Course Objective: To understand the various theories of coordination chemistry. To study the various concepts of nuclear chemistry and bonding in metals. To learn the concepts of electro chemistry and its applications

UNIT I   Nuclear Chemistry   9

Nuclear Chemistry: Fundamental particles of nucleus- isotopes, isobars, isotones and isomers – differences between chemical reactions and nuclear reactions, nuclear chain reactions - nuclear fusion and fission- Light water nuclear power plant - radioactive series.

UNIT II   Coordination Chemistry   9

Nomenclature - Werner Theory - EAN Rule – Chelation - Stability of complexes – factors affecting the stability – structural isomerism- stereoisomerism – geometrical and optical isomerism in 4 and 6 coordinated Complexes - Valence bond theory

UNIT III   Polymers and Composites   9

Polymers – definition – polymerization – types – addition and condensation polymerization –free radical polymerization and mechanism – Plastics, classification – preparation, properties and uses of PVC, polycarbonate, nylon-6,6 – Rubber – vulcanization of rubber. Synthetic rubbers. Composites – definition, types, polymer matrix composites – FRP only

UNIT IV   Chromatographic Techniques and Applications   9

Principles of adsorption and partition chromatography - Column and Paper, TLC, ion-exchange chromatography – technique and applications. Gas chromatography, principle, detector and applications. Purification of solid organic compounds: recrystallisation, sublimation.

UNIT V   Electrochemistry   9

Cells - electromotive force – electrode potential – their thermodynamic significance. Nernst equation standard electrode potentials and its determination - Reference electrodes - hydrogen, calomel and glass electrodes. Conductance – cell constant - specific conductance and equivalent conductance.

TOTAL HOURS: 45
COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Utilize the knowledge of nuclear chemistry.
CO2:   Analyze about coordination chemistry.
CO3:   Analyze study on polymers and composites.
CO4:   Adapt the fundamental concept of chromatographic techniques and applications.
CO5:   Extend the knowledge about the electromotive force and electrode potential in electrochemistry.

Text Books:
1.   Gopalan R, Text Book of Inorganic Chemistry, 2nd Edition, Hyderabad, Universities Press, (India), 2012.
2.   Morrison R.T. and Boyd R.N., Bhattacharjee S. K. Organic Chemistry (7th edition), Pearson India, (2011)
3.   Puri B.R., Sharma L.R. and Pathania M.S. (2013), Principles of Physical Chemistry, (35th edition), New Delhi: Shoban Lal Nagin Chand and Co.

Reference Books:
1.   R. Gopalan, "Elements of nuclear Chemistry" S. Viswanathan & Co., 7th edition, 2009.
2.   P. L. Soni, "Text Book of Inorganic Chemistry" Sultan Chand & sons. 32nd edition. 2013.
3.   R. D. Madhan, "Modern Inorgnaic Chemistry" S. Chand & Co., 6th edition 2012.

	PHYSICS PRACTICAL C - III	L	T	P	Credits
		0	0	4	2

Any 10 Experiments

1. Deflection magnetometer – Tan A position
2. Deflection magnetometer – Tan B position
3. Carey Foster Bridge – Determination of specific resistance of unknown coil
4. Potentiometer – EMF of thermocouple
5. Potentiometer-Calibration of Ammeter
6. Potentiometer- Calibration of Low range voltmeter
7. Field along the axis of a coil – Determination M
8. Field along the axis of a circular coil – Determination of B_H
9. Bifilar Pendulum
10. Young's modulus - Uniform bending (Optical Lever)
11. Young's modulus - Non-uniform bending (Optical Lever)

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Examine the magnetic moment of a bar magnet using deflection magnetometer by Tan A and Tan B position.

CO2: Calculate the EMF of a thermocouple.

CO3: Calculate the specific resistance of unknown coil using Carey Foster Bridge.

CO4: Measure the depression and elevation by uniform and non-uniform bending method.

CO5: Appraise the refractive index dispersive power of the prism using spectrometer.

Text Book

1. C. C. Ouseph, U. J. Rao, V. Vjiayendran, Practical Physics,1st Edition, 2015

	INORGANIC QUANTITATIVE ANALYSIS	L	T	P	Credits
	PRACTICAL	0	0	4	2

Course objective:

To know about different types to titrations namely acid base, redox, iodometry and complexometric titrations.

1. Acidimetry and alkalimetry

(a) Strong acid VS strong base

(b) Weak acid VS strong base

(c) Determination of hardness of water.

2. Permanganometry

(a) Estimation of ferrous sulphate

(b) Estimation of oxalic acid

3. Iodometry

(a) Estimation of potassium dichromate

(b) Estimation of potassium permanganate

4. Acid – Base Titrations

(a) Estimation of Hydrochloric acid using oxalic acid

(b) Estimation of sodium Hydroxide using sodium carbonate

(c) Estimation Borax

5. Redox Titration

(a) Estimation of oxalic acid using Mohr's salt

(b) Estimation of Calcium

(c) Estimation of Ferrous Sulphate using oxalic acid

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Make use of the chemicals safely in lab as well as in industry.

CO2: Estimate quantity of the acid or base in the given solution.

CO3: Determine the hardness of water.

CO4: Understand various types of titrations.

CO5: Estimate the amount of inorganic salt present in given solution.

Text Books

1. Vogel's – "Textbook of quantitative Inorganic Analysis", Longmann, 12th edition, **2011**
2. N. S. Gnanapragasam and G. Ramamurthy, Organic Chemistry lab manual, S. Viswanathan and Co. Pvt. Ltd. Chennai-1998.

Reference Books

1. S. Sundaram and K. Raghavan "Practical Chemistry", S. Viswanathan. Co. 3rd edition **2011**
2. J. N. Gurtu and R. Kapoor "Advanced experimental Chemistry", S. Chand and Co. 6th edition, **2010**

	ATOMIC PHYSICS	L	T	P	Credits
		4	0	0	4

Course Objective: To make the student understand the principles of atomic physics. To enable the student to explore the field of atomic structure, energy levels, and X-rays.

UNIT I   Discharge Phenomenon through Gases   9
Motion of a charge in transverse electric and magnetic fields - Specific charge of an electron - Dunnington's method - Positive rays – Aston's and Dempster's mass spectrographs.

UNIT II   Photo-electric Effect   9
Richardson and Crompton experiment - Laws of photoelectric emission - Einstein photo electric equation - Millikan's experiment - Verification of photoelectric equation - Photo electric cells - Photo emissive cells - Photovoltaic cell - Photo conducting cell - Photomultiplier.

UNIT III   Atomic Structure   9
Vector atom model - spatial quantization–various quantum numbers -Pauli's exclusion principle - angular momentum and magnetic moment - coupling schemes - LS and JJ coupling - Bohr magnetron – Selection rules - Explanation of periodic table - Stern and Gerlach experiment.

UNIT IV   Ionization Potential and Splitting of Energy Levels   9
Excitation and ionization potential - Davis and Goucher's method - Zeeman effect - Larmor's theorem - Debye's explanation of normal Zeeman effect - Anamalous Zeeman effect - theoretical explanation. Lande's 'g' factor and explanation of splitting of D1 and D2 lines of sodium - Paschen back effect-theory - Stark effect (qualitative treatment only).

UNIT V   X-Rays   9
Origin of X- ray spectrum – Continuous and characteristics spectra – X-ray Spectroscopy – Auger effect - X-ray absorption and fluorescence - Moseley's law - uses of X-rays - Compton Effect - experimental verification of Compton Effect.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Understand the discharge Phenomenon through Gases.
CO2:   Understand the basic concepts of photo electric effect and their applications.
CO3:   Explain the structure of the atom.
CO4:   Explain Ionization Potential and Splitting of Energy Levels.
CO5:   Explain the change in behaviour of atoms in external applied electric and magnetic field.

Text Books
1. R. Murugeshan, KiruthigaSivaprasath, Modern Physics, S. Chand & Co., New Delhi, 2008.
2. N Subramanian and Brij Lal, Atomic and Nuclear Physics, S. Chand & Co. - 2000

References
1. Robley D. Evans, The Atomic Nucleus, TMH, 1982
2. Christopher. J. Foot, Atomic physics, Oxford University Press Inc, 2005.

	GENERAL CHEMISTRY II	L	T	P	Credits
		4	0	0	4

Course Objective: To learn the basics of spectral analysis and nature of the compound**.** To understand the properties and applications of carbohydrates, amino acids and proteins. To study the basic nature of halogens and noble gases. To study the properties of aromatic compounds and organic reactions.

UNIT I   Analytical Techniques   9
Beer–Lambert's law (problem) – UV – visible spectroscopy and IR spectroscopy – principles – instrumentation (block diagram only) – estimation of iron by colorimetry – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry.

UNIT II   Carbohydrates, Aminoacids and Proteins   9
Carbohydrates: classification – glucose and fructose – preparation and properties –structure of glucose – Fischer and Haworth cyclic structures.
Amino acids and proteins: Amino acids – Classification based on structure.
Essential and non – essentials amino acids – preparation, properties and uses – peptides (elementary treatment only) – proteins – Classification based on physical properties and biological functions. Structure of proteins – primary and secondary (elementary treatment).

UNIT III   Aromaticity and Preparation of Aromatic Compounds   9
Aromaticity-Huckel's rule-resonance in benzene –electrophilic substitution in aromatic compounds-general nitration, sulphonation, chlorination - Friedelcraft's alkylation and acylation- polynuclear hydrocarbons – naphthalene, anthracene and phenanthrene – preparation, properties and uses.

UNIT IV   Halogens and Nobel Gases   9
Comparative study of F, Cl, Br, I– elements reactivities, hydrogen halides, oxides and oxyacids. Exceptional properties of Fluorine. Electronic configuration and position of halogens in the periodic table. Applications, clathrates and compounds of xenon, hybridization and geometries of XeF_2, XeF_4, $XeOF_4$.

UNIT V   Photosynthesis and Toxicity   9
Chloroplast- light reactions – structure of chlorophyll- Photosynthesis – Reactions – Type I and Type II photosynthetic reactions – Role of Manganese complex in evolution of oxygen Toxicity – Hg, Cd, Zn, Pb, and As.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Apply the principle and application of UV-Visible and IR Spectroscopy.
CO2:   Demonstrate the structure of Carbohydrates, Aminoacids and Proteins.
CO3:   Identify aromaticity and Preparation of Aromatic Compounds.
CO4:   Understand Properties and uses of Halogens and Nobel Gases.
CO5:   Demonstrate the reaction of Photosynthesis and Toxicity.

Text Books
1. P. L. Soni, "Text Book of Organic Chemistry" Sultan Chand & sons. 32nd edition. 2013
2. R. D. Madhan, "Modern Inorgnaic Chemistry" S. Chand & Co., 6th edition 2012
3. Lippard and Berg, "Principle of Bioinorganic Chemistry" –University- Science Book 7th edition, 1994

Reference Books
1. Robert Thornton Morrison, Robert Neilson Boyd, "Organic Chemistry" Ashok K. Ghosh 10th edition, 2013
2. James E. Huheey, Ellen, A. Keiter, Richard, L. Keiter, "Inorganic Chemistry" Pearson education (Singapore Pvt Limited) 9th edition, 2013

	PHYSICS PRACTICAL C - IV	L	T	P	Credits
		0	0	4	2

Any 10 Experiments

1. Rigidity modulus - Static torsion
2. Lamis Theorem
3. Young's modulus- Cantilever/Stretching (pin & microscope)
4. Post office box – Temperature coefficient
5. Spectrometer – i-d curve
6. Spectrometer- i-i' curve using prism.
7. Sonometer – AC frequency
8. Potentiometer- Calibration of High range voltmeter
9. LCR series resonance circuit
10. LCR parallel resonance circuit
11. Melde's string

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Determine the refractive index of the prism using spectrometer i-d curve.
CO2: Analyze the rigidity modulus of a wire by static torsion method.
CO3: Measure the temperature coefficient of resistance of a given wire by P.O box method.
CO4: Determine the frequency of the tuning fork by using Sonometer.
CO5: Construct the calibration of high range ammeter circuit using potentiometer.

Text Book

1. C. C. Ouseph, U. J. Rao, V. Vjiayendran, Practical Physics,1ˢᵗ Edition, 2015

	INORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS PRACTICAL	L	T	P	Credits
		0	0	4	2

Course objective:
To learn the technique to identify acid radicals and basic radicals of each two with to interfering radicals as well as to prepare simple coordination compounds.

Inorganic Qualitative Analysis

Reactions of mercury, lead, copper, bismuth, cadmium, antimony, tin, ferrous and ferric iron, aluminium, zinc, manganese, cobalt, nickel, calcium, strontium, barium, magnesium, and ammonium; sulphide, carbonate, nitrate, sulphate, chloride, bromide, iodide, fluoride, oxalate, arsenite, phosphate, chromate and borate radicals.

Semimicro analysis of a mixture containing one cation and one anion.

List of Experiments

1. Reaction of simple radicals.
2. Reactions of groups I, II and III cations.
3. Reactions of groups IV, V and VI cations.
4. Analysis of salt mixture – I
5. Analysis of salt mixture – II
6. Analysis of salt mixture – III
7. Analysis of salt mixture – IV
8. Analysis of salt mixture – V
9. Preparation of Ferrous ammonium sulphate.
10. Preparation of tetraamminecopper (II) sulphate.
11. Preparation of potassium trioxalatoluminate.
12. Preparation of potassium trioxalatochromate.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Make use of the chemicals safely in lab as well as in industry.
CO2: Utilize the procedure for analyzing an inorganic salt.
CO3: Understand the reaction of simple radicals.
CO4: Identify acid and basic radicals in a simple inorganic salt.
CO5: Analyze the preparation of simple coordination compounds.

Text Book:

1. Vogel's – "Textbook of qualitative Inorganic Analysis", Longmann, 12th edition, 2011

Reference Books:

1. S. Sundaram and K. Raghavan "Practical Chemistry", S. Viswanathan.Co. 3rd edition 2011
2. J. N. Gurtu and R. Kapoor "Advanced experimental Chemistry", S. Chand and Co. 6th edition, 2010

SYLLABUS

DISCIPLINE SPECIFIC

ELECTIVE (DSE) COURSES

	ANALOG & DIGITAL ELECTRONICS	L	T	P	Credits
		5	0	0	5

Course Objective: To understand the concept of diodes and transistors. To familiarize the operation of amplifiers. To understand the basic concepts of number systems. To develop the digital concepts using logic gates. To apply digital concepts in sequential logic systems. To study operational amplifiers and clocks.

UNIT I   Diode Characteristics and Applications   9

Zener Diode and its breakdown mechanism - voltage regulator - Half wave and full wave rectifier and their efficiency calculation - Ripple factor - Equivalent circuit – linear circuit analysis - Tunnel diode - Varactor diode - Gunn diode – Photo diode - LED.

UNIT II   Transistor Characteristics and Biasing Techniques   9

Transistor-Transistor characteristics - CB, CE, CC - comparison between the three configurations - basic CE amplifier circuit -selection of operating point - need for bias stabilization - requirements of a biasing circuit - fixed bias - voltage divider biasing circuit -Types of FET - JFET - working principle - symbol - comparison with bipolar transistor - output characteristics - JFET parameters.

UNIT III   Amplifiers   9

Single stage transistor amplifier - BJT, FET – Single stage amplifier-Multistage amplifier – graphical method - equivalent circuit method - gain of a multistage amplifier - RC and transformer coupling - frequency response curve of an RC coupled amplifier - analysis of two stage RC coupled amplifier - classification of amplifiers - single ended and power amplifier - push pull amplifier.

UNIT VI   Number Systems and Logic Gates   9

Number Systems and Logic Gates: Different Number Systems -Binary, Octal and Hexa-decimal. Conversion between the number systems. Different Digital codes - ASCII, BCD, Gray codes. Basic logic gates: AND, OR, NOT, NOR, NAND, Ex-OR (Symbol, Truth-table, Circuit diagram, Working) Boolean algebra and K-Maps, Introduction, SOP and POS form of Boolean function, Karnaugh Map simplification (upto 4 variables), implementations of SOP and POS form using NAND, NOR gates

UNIT V   Combinational and Sequential Circuits   9

Half adder, full adder, 8421 adders, 1's and 2's complement adders/subtractor, Excess 3 adder, multiplexer, demultiplexer, encoders and decoders, Flip-Flop (RS, JK, Master Slave JK, D and T-Type) Shift Register, Binary Counter, Modulo- N counter, up-down counter.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Understand the properties and applications of semiconductor diodes.
CO2:   Analyze the rectifier and regulator circuits.
CO3:   Design and implement combinational logic circuits using reprogrammable logic devices.
CO4:   Demonstrate the programs of digital to analog and analog to digital conversion.
CO5:   Create circuits to solve clocked Flip-Flops problems.

Text Books:
1. Basic Electronics (Solid state), B.L. Theraja, S. Chand & Co., (2000)
2. Principles of Electronics, Metha, V.K. S. Chand & Co., (2001)
3. Digital Principles and Applications, Malvino and Leach, TMH.

Reference Books:
1. Digital Electronics, Avinash Kapoor &Maheswari, Principles and Practice.
2. Digital Electronics, A.P. Godse, Technical Publisher, Pune.

	LASER PHYSICS & SPECTROSCOPY	L	T	P	Credits
		5	0	0	5

Course Objective: To enable the students to understand the basic concepts of Lasers. To emphasize the principles involved in various spectroscopes.

UNIT I   Fundamentals of Lasers and Types   9
Characteristics of a Laser - Directionality- High Intensity-High Degree of Coherence- Spatial and temporal coherence- Spontaneous and stimulated emission - Einstein's coefficients and possibility of Amplification- Population Inversion- Laser pumping- Resonance cavity- Threshold condition for Laser emission - Ruby Laser-He-Ne Laser - Nd-YAG laser- Applications of Laser. Laser-CO_2

UNIT II   Control of Laser Properties and Production   9
Resonators - Vibration modes of resonators- Number of modes/unit volume - Open resonators- Control resonators - Q Factor- Losses in the cavity - Threshold condition - Quantum Yield – Mode locking (active and passive) - Q Switching.

UNIT III   Microwave Spectroscopy   9
Rotation of molecules-Rotational Spectra-Rigid and non-rigid diatomic rotator-Intensity of spectral lines-Isotopic Substitution-Poly atomic molecules (Linear and symmetric top)-Hyperfine structure and quadrupole effects-Inversion spectrum of ammonia chemical analysis by Microwave Spectroscopy-Techniques and instrumentation**.**

UNIT IV   Infra-Red Spectroscopy   9
Basic Theory- Vibration of molecules-Diatomic vibrating rotator-vibrational rotational spectrum -Influence of rotation on the vibrational spectrum of linear and symmetric top and poly atomic molecules -Instrumentation-Sample Handling- Characteristic Vibrational Frequencies- Effect of Hydrogen Bonding and solvent effect on Vibrational Frequencies- Overtones- Combination bands and Fermi Resonance-FTIR.

UNIT V   Resonance Spectroscopy   9
NMR - Basic principles - Classical and quantum mechanical description- Bloch equations - Spin-spin and spin-lattice relaxation times – Chemical shift and coupling constant Experimental methods – Single coil and double coil methods. ESR: Basic principles – ESR spectrometer – Nuclear interaction and hyperfine structure – relaxation effects – g-factor – Characteristics – Free radical studies and biological applications.

TOTAL HOURS: 45
COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Understand the fundamental and operation principle of modern lasers.
CO2:   Apply the laser operation principles to atom and molecular physics, solid state physics, quantum mechanics and physical optics.
CO3:   Demonstrate solid knowledge of modern laser spectroscopic techniques.
CO4:   Interpret IR spectroscopy. Explain working principles and taking spectrum of IR spectroscopy device.
CO5:   Examine the properties of different materials by applying the basic principles of NMR and ESR spectroscopy by these characterizations.

Text Books
1. Colin Banwell and McCash, Fundamentals of Molecular Spectroscopy, TMH Publishers, 4th Edition, 2002.
2. R. Murugeshan - Optics & Spectroscopy, S. Chand & Co., New Delhi
References
1. SuneSvanbag, Atomic and Molecular Spectroscopy: Basic Aspects and Practical Applications, Springer, 3rd Edition, 2001.
2. Jeanne L Mc Hale, Molecular Spectroscopy, Pearson Education, 1Indian Edition, 2008.
3. Aruldhas G., Molecular Structure and Spectroscopy, Prentice Hall of India, 2001.

	NULCEAR & PARTICLE PHYSICS	L	T	P	Credits
		5	0	0	5

Course Objective: To make the student understand the principles of nuclear physics. To enable the student to explore the field of nuclear structure. To understand the concept of radioactivity, nuclear fission and fusion. To understand the elementary particles and their interactions.

UNIT I   Structure of Nuclei   9
Structure of nucleus – Nucleus properties- Nuclear size –Density – Charge – Spin – Nuclear magnetic moment - Electric quadrupole moment - Atomic mass unit and binding energy - Mass defect and packing fraction – Nuclear Model – Liquid drop model – Shell model – Magic numbers.

UNIT II   Radioactivity   9
Radioactive decay laws - Half life and mean life – α, β and γ decays – properties - Activity - Successive transformation - Radioactive equilibrium – Radioactive dating - α- decay - Geiger-Nuttall law - Gamow's theory of α decay - β-decay - Continuous β-spectrum - Neutrino hypothesis - Gamma rays-origin of the gamma rays - Internal conversion.

UNIT III   Nuclear Detectors & Accelerators   9
 Principle and working - solid state detector - proportional Counter - Wilson's cloud chamber - Scintillation counter. Accelerators: Synchrocyclotron - Synchrotron - Electron synchrotron - proton synchrotron - Betatron.

UNIT IV   Nuclear Fission and Fusion   9
Nuclear fission – Energy released in Fission – Bohr and Wheelers theory of Nuclear fission – Chain reaction – Multiplication factor – Critical size – Natural Uranium and chain reactions – Atom Bomb – Nuclear reactor – Nuclear fusion – Source of Stellar energy – Carbon Nitrogen cycle – Proton-Proton cycle – Hydrogen bomb – Controlled thermo nuclear reactions.

UNIT V   Elementary Particles   9
Classification - types of interaction - symmetry and conservation laws - hadrons - leptons - baryons - mesons - strangeness - hyperons - antiparticles - antimatter - basic ideas about quarks - types of quarks.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Demonstrate the knowledge of fundamental aspects of the structure of the nucleus.
CO2:   Illustrate the radioactive decay, nuclear reactions and the interaction of radiation.
CO3:   Develop the various types of nuclear detectors and accelerators.
CO4:   Apply the knowledge of nuclear fission and fusion reactions.
CO5:   Classify different kinds of interactions between elementary particles.

Text Books
1. D. C. Tayal, Nuclear Physics, Himalaya Publishing House, 2009
2. S. N. Ghoshal, Nuclear Physics, S. Chand & Co., Edition, 2003.

References
1. M. L. Pandya& R. P.S. Yadav, Elements of Nuclear Physics, KedaarNath& Ram Nath, 2000.
2. Satya Prakash, Nuclear Physics, APragatiPrakasan Publication, 2011.
3. Jahan Singh, Fundamentals of Nuclear Physics, APragati Publication, 2012.

	DISCIPLINE SPECIFIC ELECTIVE PRACTICAL- I	L	T	P	Credits
		0	0	4	2

Any 10 Experiments
1. Transistor characteristics Common Emitter.
2. Transistor characteristics Common Base.
3. Regulated power supply using zener diode characteristics
4. PN junction diode characteristics
5. Dual power supply using IC
6. OPAMP-Characteristics using IC (Adder, Subtractor, Differentiator & Integrator)
7. Basic gates (OR, AND, NOT. NOR, NAND and XOR)
8. Astable multivibrator using IC555
9. Monostable multivibrator using IC555
10. NAND and NOR as universal gate
11. D/A convertor
12. Colpitt's Oscillator

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Construct and verify the operations of basic logic gates.
CO2: Construct and verify the operations of universal logic gates**.**
CO3: Analyze and understand the working of D/A convertor and A/D convertor.
CO4: Construct and verify the characteristics of operational amplifier using IC741.
CO5: Design and verify the operations of astable and monostable multivibrator using IC555.

Text Book
1. C. C. Ouseph, U. J. Rao, V. Vjiayendran, Practical Physics,1st Edition, 2015

	SOLID STATE PHYSICS	**L**	**T**	**P**	**Credits**
		5	**0**	**0**	**5**

Course Objective: The course is to understand the basic knowledge on crystal structures and crystal systems. To understand the various techniques available in X-Ray Crystallography. To acquire the knowledge of bonding in solids and Lattice waves. To comprehend the concepts of dielectric properties of solids and superconductivity.

UNIT I   Crystal Physics   9
Crystalline and amorphous solids- Lattice and basis-Unit cell and primitive cell-Crystal systems- Bravais lattice - Cubic Crystal system - Simple - Body centered and face centered cubic lattices-Hexagonal close packed - Miller indices -Interplanar spacing.

UNIT II   Bonding in Solids   9
Types of bonds in crystals – Ionic, covalent, metallic, Van-der-Waal's and hydrogen bonding – characteristic of various bonding – cohesive energy of cubic ionic crystals – Madelung constant for sodium chloride crystal – Phonons – monoatomic one-dimensional lattice – specific heat of solids – Einstein's theory – Debye theory.

UNIT III   Free Electron Theory of Metals   9
Free electron theory – Drude Lorentz theory – Explanation of Ohm's law – Electrical conductivity – Thermal conductivity –Wiedmann and Franz law – Hall effect – Hall voltage and Hall coefficient – Mobility and Hall angle – Importance of Hall effect – Experimental determination of Hall coefficient.

UNIT IV   Dielectrics and Superconductivity   9
Dielectrics- Dielectric constant and displacement vector – Polarization – Types of polarization – Clausiss-Mossotti relation– Superconductivity Occurrence of superconductivity – Destruction of superconductivity by magnetic fields – Meissner effect - Type I and Type II superconductors – London equation – Josephson effect – Elements of BCS theory –Application of superconductors.

UNIT V   Magnetic Properties   9
Different types of magnetic materials - classical theory of diamagnetism (Langevin theory) - Langevin theory of paramagnetism - Weiss theory of paramagnetism – Heisenberg interpretation on internal field and quantum theory of ferromagnetism - Antiferromagnetism - Hard and soft magnetic materials.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Demonstrate the knowledge of crystal systems and spatial symmetries.
CO2:   Illustrate the different types of matter depending on nature chemical bonds and their properties.
CO3:   Identify the lattice vibration phenomenon and thermal properties of solids.
CO4:   Understand the basic concepts of free electron theory of metals.
CO5:   Develop the applications of dielectric and superconducting materials.

Text Books
1. Pillai S.O., Solid State Physics, 6th Edition, New Age Science, 2013.
2. Charles Kittel, Introduction to Solid State Physics, Wiley, 2005.

 References
1. Ashcroft W and Mermin N.D., Solid State Physics, Holt-Rinehart-Winston, 1976.
2. Blakemore J. S., Solid State Physics, 2nd Edition, Cambridge University Press, Cambridge, 1974.
3. Dekker A. J., Solid State Physics, Mac Millan, 1971.

	NANOMATERIALS AND APPLICATIONS	L	T	P	Credits
		4	0	0	4

Course Objective: To make the student understand the basic concepts in nanoscience. To enable the student to explore the field of nanomaterials. To acquire knowledge on the various applications of nanotechnology.

UNIT I   Basics of Nanoscience   9
Nano revolution of the 20th century - Difference between bulk and nanoscale materials and their significance – Confinement effect - Optical property - Magnetic property and electronic property - Size dependent behavior – Scaling - Mechanical properties of Nano materials and Chemical properties of Nanoparticles.

UNIT II   Classes of Nanomaterials   9
Metals and Semiconductor Nanomaterials - Quantum dots - Quantum Wires - Quantum wells - Bucky balls - Carbon nanotubes (CNT) - Single walled and Multi walled CNT-Structure - Fullerenes/Bucky Balls/ C60 – Graphene – Hybrid nano composites.

UNIT III   Synthesis of Nanomaterials   9
Top-down approach – Nanolithography - Soft lithography and hard lithography - E-beam lithography – Ball milling – Bottom-up approach - Physical Vapor deposition (PVD) - Chemical Vapor Deposition(CVD) – Sol-gel processing and Hydrothermal methods.

UNIT IV   Characterization of Nanomaterials   9
X-Ray Diffraction (XRD) - Scanning Electron Microscope (SEM) - Transmission Electron Microscope (TEM) - Atomic Force Microscope (AFM) - Scanning Tunneling Microscopy (STM) – UV-Vis absorption spectroscopy – Brunauer–Emmett–Teller (BET) Surface area analysis – X-Ray Photoelectron Spectroscopy (XPS).

UNIT V   Applications of Nanomaterials   9
Energy – Solar Cells and Fuel cells – Energy Storage – Battery and Supercapacitor – Environment – Photocatalysis and waste water treatment – Electronics – Nano Electro Mechanical Systems (NEMS) - Sensors.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Demonstrate the general concepts and physical phenomena of relevance within the field of nanoscience.
CO2:   Classify the different types of nanostructures based on their dimensionality.
CO3:   Select the various Lithographic techniques for fabrication at nanoscale.
CO4:   Apply the various characterization techniques for synthesized nanomaterials.
CO5:   Identify different types of nanomaterials and its applications.

Text Books
1. Pradeep T., Fundamentals of Nanoscience and Nanotechnology, McGraw Hill, 2012.
2. Chris Binns, Introduction to Nanoscience and Nanotechnology, 1ST Edition, Willey- Publication, 2010.

References
1. Gabor L. Hornyak, H. F. Tibbals, Joydeep Dutta, John J. Moore, Introduction to Nanoscience and Nanotechnology, CRC Press, 2008.
2. Chattopadhay K.K., Introduction to Nanoscience and Nanotechnology, APH Publishing Corporation, 2006.
3. Charles P. Poole Jr and Frank J. Owens, Introduction to Nanotechnology, Wiley Interscience, 2007.

	DISCIPLINE SPECIFIC ELECTIVE PRACTICAL- II	L	T	P	Credits
		0	0	4	2

Any 10 Experiments
1. Semiconductor Diode – To determine the particle size using diffraction method.
2. Determination of band gap of a semiconductor material
3. Band gap determination of a thermistor using meter bridge
4. Resistivity determination for a semiconductor wafer – Four probe method Dielectric Constant Measurement
5. Characteristics of thermistor.
6. Characteristics of photo diode
7. Characteristics of solar cell
8. Determination of compressibility of a material using ultrasonic interferometer
9. Sonometer – R.D of a solid and liquid
10. Spectrometer – Cauchy's constant
11. Copper Voltammeter – Determination of B_H

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Determine the particle size by diffraction method using semiconductor diode laser.
CO2: Analyze the V-I characteristics of photodiode.
CO3: Analyze the V-I characteristics of solar cell.
CO4: Determine the resistivity of a semiconductor material by four probe method.
CO5: Determine the magnetic field induction by copper voltammeter.

Text Book
1. C. C. Ouseph, U. J. Rao, V. Vjiayendran, Practical Physics,1st Edition, 2015

	ENERGY PHYSICS	L	T	P	Credits
		4	0	0	4

Course Objective: To make the students to understand the present-day crisis of need for conserving energy and alternatives are provided.

UNIT I   Conventional Energy Sources   9
Conventional Energy Sources - Coal – Oil – Gas – Agriculture and Organic Wastes – Water Power – Nuclear Power – thermal Power

UNIT II   Non-Conventional Energy Sources   9
Non-Conventional Energy Sources - Solar Energy – Wind Energy – Energy from Bio Mass and Bio-Gas – Ocean Energy – Tidal Energy – Geo Thermal Energy – Advantages of Renewable Energy

UNIT III   Solar Energy   9
Solar Radiation – Solar Constant – Solar Radiation Measurements – Pyrheliometers – Pyranometers – Estimation of Average Solar Radiation – Applications of Solar Energy

UNIT IV   Wind Energy   9
The Nature of Wind – Power in The Wind – Wind Energy Conversion – Basic Components of a Wind Energy Conversion System (WECS)- Advantages and Disadvantages Of WECS.

UNIT V   Energy from Biomass   9
Biomass Conversion Technologies – Wet Process – Dry Process – Photosynthesis – Bio Gas Generation – Bio Gas from Plant Wastes – Methods for Maintaining Biogas Production – Fuel Properties of Bio Gas

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Illustrate the knowledgeabout conventional energy sourcesand the working of thermal and nuclear power plant.
CO2:   Demonstrate the general concepts of non-conventional energy sources and its types.
CO3:   Apply the knowledge of solar energy for domestic purposes.
CO4:   Understand the basic concept of wind energy and wind energy conversion system.
CO5:   Identify different types of biogas production technique.

Text Books:
1. G.D. Rai, Non- Conventional Energy Sources, Khanna Publishers, 2011
2. D.P. Kothari, K.C. Singal& Rakesh Ranjan, Renewable energy sources and emerging Technologies, Prentice Hall of India Pvt. Ltd., New Delhi (2008).

References:
1. Solar Energies of Thermal Processes, A. Duffie and W. A. Beckmann, John-Wiley, 1980.
2. F. Kreith and J. F. Kreider, Principle of Solar Engineering, McGraw-Hill, 1978
3. S.A. Abbasi and NasemaAbbasi, Renewable Energy sources and their environmental impact, PHI Learning Pvt. Ltd., New Delhi, 2008.

	LOW TEMPERATURE PHYSICS	L	T	P	Credits
		4	0	0	4

Course Objective: To understand the general scientific concepts of low temperature physics. To understand the properties of materials at low temperature. To educate the new techniques available to produce and measure low temperatures. To understand the concept of specific heat and hyperfine properties.

UNIT I   Production of Low Temperature   9
Introduction - Joule Thomson effect - Regenerative cooling - Vacuum pumps - liquefaction of air - Hydrogen - Helium - Maintenance of low temperature -production of temperature below 1 K - Adiabatic demagnetization - Evaporative cooling of He-3 - Dilution refrigeration - Laser cooling - Nuclear demagnetization.

UNIT II   Measurement of Low Temperature   9
The gas thermometer and it corrections - Secondary thermometers- resistance thermometers, thermocouples- vapour pressure thermometers- magnetic thermometers.

UNIT III   Liquid and Solid Cryogens   9
Liquid Nitrogen - Liquid oxygen - Liquid hydrogen - Liquid He -4 and He -3 - Solid He– 4 and He -3 - Lamda point - Superfluidity - Density - Compressibility factor - viscosity and thermal properties - Velocity of sound in liquid helium.

UNIT IV   Electrical and Magnetic Properties   9
Experimental observations - Theories of Sommerfield and block - Superconductivity - magnetic properties of superconductors - Thermal properties of superconductors - penetration depth and high frequency resistance - Ferromagnetism - Diamagnetism - paramagnetism - Paramagnetic saturation.

UNIT V   Specific Heats, Spectroscopic and Hyperfine Properties   9
Specific heats - Rotational specific heat of Hydrogen – Einstein's and Debye's theories -Schottky effect - Anomalies in specific heats at low temperature - Infrared- visible spectra - Zeeman spectra at low temperature - Dielectric constant and its measurement - Magnetic susceptibility - NMR and electron paramagnetic resonance at low temperature - Nuclear magnetic properties - Mossbauer effect and other hyperfine properties at low temperature.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Understand the basic concepts of low temperature physics
CO2:   Identify the properties of materials at low temperature.
CO3:   Apply the new techniques available to produce and measure low temperature.
CO4:   Measure the NMR and electron paramagnetic resonance at low temperature.
CO5:   Analyze the concept of specific heat and hyperfine properties.

Text Books:
1. Cornelis Jacobus Gorter, D. F. Brewer, Progress in Low Temperature Physics, Elsevier Ltd, 2011.
2. Christian E. and Siegfried H, Low Temperature Physics, Springer, 2005.

References:
1. Jack Ekin, Experimental Techniques for Low-Temperature Measurements, OUP Oxford, 2006.
2. Charles P. Poole Jr., Horacio A. Farach, Richard J. Creswick and RuslanProzorov, Superconductivity Elsevier Ltd, 2007.
3. John Wilks, Properties of Liquid and Solid Helium, Oxford University Press, 1967.
4. Jackson L.C., Low Temperature Physics, Methuen and Company, 1962.
5. Ching Wu Chu and J. Woollam, High Pressure and Low Temperature Physics, Plenum Press, 1978.

	LASER PHYSICS	L	T	P	Credits
		4	0	0	4

Course Objective: To introduce the physical and engineering principles of laser operation and their applications.

UNIT I   Fundamentals of LASER   9

Spontaneous emission – stimulated emission – metastable state – Population inversion – pumping – Laser Characteristics

UNIT II   Types of LASER   9

Nd-YAG laser - Helium – Neon Laser – Ruby Laser – CO_2 Laser – Semiconductor Laser (homojunction and heterojunction)

UNIT III   Industrial Applications of LASER   9

Laser cutting – welding – drilling – Hologram – Recording and reconstruction of hologram

UNIT IV   Lasers in Medicine   9

Lasers in Surgery – Lasers in ophthalmology – Lasers in cancer treatment

UNIT V   Lasers in Communication   9

Optic fibre communication- Total internal reflection – Block diagram of fibre optic communication system – Advantages of fibre optic communication

TOTAL HOURS: 45

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Understand the fundamental and basic characteristics of laser.
CO2:   Classify the types of laser and identify their applications.
CO3:   Demonstrate solid knowledge of modern laser spectroscopic techniques.
CO4:   Examine the medical applications using laser source of light.
CO5:   Analyze the advantages of fibre optic communication using laser source.

Text Books:
   1. N. Avadhanulu, An introduction to LASERS, S. Chand & Company, 2001

References:
   1. William T. Silfvast, Laser fundamentals, Cambridge University Press – Published in South Asia by foundation books, 23, Ansari Road, New Delhi.
   2. K. Thyagarajan and A. K. Ghatak, LASER Theory and Application, Mac millan, India Ltd.

	SOLAR TECHNOLGY	L	T	P	Credits
		4	0	0	4

Course Objective: To learn the fundamentals of Solar Energy Technologies. To learn the solar thermal based energy systems. To learn basic principles and applications of Photovoltaic systems.

UNIT I   Solar Radiation   9
Energy emitted by sun and energy that reaches the earth - Sun-Earth Geometry-Solar angles - Angles of incidence- Zenith angle - Azimuthal angle - Hour angle - Latitude and longitude - Solar Spectrum and Solar constant – Extraterrestrial characteristics - Measurement and estimation on horizontal and tilted surfaces.

UNIT II   Solar Collectors   9
Solar Collector Basics - Flat plate collector – Evacuated tubular collectors - Concentrator collectors - Tracking systems - Compound parabolic concentrators - Parabolic trough concentrators - Concentrators with point focus.

UNIT II   Solar Thermal Technologies   9
Solar heating and cooling system - Principle of working – Types - Design and operation - Thermal Energy storage - Types of thermal Energy Storage systems - Sensible Heat Storage – Liquids - Latent heat Storage - Thermo chemical storage - Solar thermal power plant - Solar Desalination - Solar cooker – Domestic - Community - Solar pond technology - Principle of working and description - Solar drying.

UNIT IV   Solar Photovoltaic Fundamentals and Design   9
Semiconductor – Properties – Energy levels – P-N junction - Homo and hetro junctions – Basic Silicon Solar cell - Efficiency limits – Variation of efficiency with band gap and temperature - Photovoltaic cell – Photovoltaic module – PV array - Solar cell array design concepts – PV system design - Hybrid and Grid connected system – System installation – Operation and maintenances

UNIT V   Solar Passive Architecture   9
Passive heating concepts - Direct heat gain – Indirect heat gain - Thermal storage wall - Attached Greenhouse – Isolated gain and sunspaces – Passive cooling concepts - Evaporative cooling – Shading and ventilation - Radiative cooling – Green coupling - Application of wind - Water and earth for cooling – Paints and cavity walls for cooling – Roof radiation traps – Energy efficient landscape design.

TOTAL HOURS: 45

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Understand the fundamentals of solar energy technologies.
CO2:   Construct the solar heating and cooling system.
CO3:   Analyze the V-I characteristics of PV cells.
CO4:   Design the solar photovoltaic cells and study the installation process.
CO5:   Describe the fundamental concepts of solar passive architecture.

Text Books:
1. Sukhatme S P and J K Nayak, Solar Energy, Principle of Thermal Storage and Collection, 3rd Edition, Tata McGraw Hill, 2008.
2. Chetan Singh Solanki, Solar Photovoltatics, Fundamentals, Technologies and Applications, PHI Learning Private Limited, 2011.
References:
1. Peter Würfel, Physics of Solar Cells: From Basic Principles to Advanced Concepts, Wiley-VCH, 2009.
2. Jeffrey M. Gordon, Solar Energy: The State of the Art, Earthscan, 2013.
3. Garg H. P. and Prakash J., Solar Energy Fundamentals and application, Tata McGraw- Hill Publishing, 7thReprint 2006.
4. Roger A. Messenger and Jerry Vnetre, Photovoltaic Systems Engineering, CRC Press, 2010.
5. Kalogirou S. A., Solar Energy Engineering: Processes and Systems, 2ndEdition, Academic Press, 2013

SYLLABUS
GENERIC ELECTIVE
COURSES

	BASIC PHYSICS	L	T	P	Credits
		3	0	0	3

Course Objectives: To understand the basic concepts of Physics

UNIT I   **6**
Mechanics Force – Weight – Work – Energy – Power – Horsepower – Centrifuge – Washing machine

UNIT II   **6**
Heat Variation of boiling point with pressure – Pressure cooker – Refrigerator – Air Conditioner – Principle and their capacities – Bernoulli principle – Aero plane

UNIT III   **6**
Sound and Optics Sound waves – Doppler effect – Power of lens – Long sight and short sight – Microscope – Telescope – Binocular – Camera

UNIT IV   **6**
Geo Physics and Medical Physics Earthquake – Richter scale – thunder and lightning – Lightning arrestors – Cosmic showers – X-rays – Ultrasound scan – CT scan – MRI scan

UNIT V   **6**
Space science and Communication Newton's law of gravitaion – Weather forecasting and communication satellites – Indian satellites – Electromagnetic spectrum – Radio waves – AM and FM transmission and reception

TOTAL HOURS: 30

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Understand the basic concepts of physics.
CO2:   Understand the working principle of Bernoulli and their applications.
CO3:   Make use of lens, microscope and telescope in optical systems.
CO4:   Analyze the properties and applications of X-rays.
CO5:   Construct the AM and FM transmission and reception circuit.

Text Book

1. The Learner's series – Everyday science – Published by INFINITY BOOKS, New Delhi

2. The Hindu speaks on Science, Vol I & II, Kasturi & Sons, Chennai

Reference

1. D. Halliday, R. Rensick and J. Walker, Fundamentals of Physics, 637th edition, Wiley, NY (2001).

2. D. Halliday, R. Resnick and K. S. Krane, Physics, Vols I, II, III, 4th Edition, Wiley, New York (1994).

3. R. P. Feynmann, R.B. Leighton & M. Sands, The Feymann Lectures on Physics Vols I, II, III, Narosa, New Delhi (1998)

	EVERYDAY PHYSICS	L	T	P	Credits
		3	0	0	3

Course Objectives: To understand the working of things which we use in everyday life

UNIT I   **8**

Physics behind Home appliances – Light bulb – Fan – Hair drier – Television – Air Conditioners – microwave ovens – Vacuum cleaners – Dishwasher – Washing machines

UNIT II   **8**

How things work – Basic principles – Tape recorder – Taps – Lifts – Submarines – Jet planes – Helicopters – Rockets – fax machines – Pagers – Cellular phones

UNIT III   **7**

Demonstration – making a switch board with multiple points – wiring – one lamp controlled by one switch/Two switches – fixing a fuse – soldering – P.C.B Preparation

UNIT IV   **7**

Study of resistors, chokes, Capacitors and Transformers – multimeter – Basic principles – measurement of resistance, Voltage AC & DC

TOTAL HOURS: 30

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Understand various circuital components and their combinations in a circuit.
CO2:   Analyze various electrical parameters and their significance involved AC and DC circuits.
CO3:   Identify the electrical symbols and circuits, applying it to power circuits.
CO4:   Utilize the resistors, chokes and capacitors in electrical and electronic devices.
CO5:   Demonstrate the hands-on learning of multimeter, voltmeter and ammeter.

Text Book

1. The Learner's series – Everyday science – Published by INFINITY BOOKS, New Delhi
2. The Hindu speaks on Science, Vol I & II, Kasturi Ranga Publishers, Chennai Books for

Reference:

1. D. Halliday, R. Rensick and J. Walker, Fundamentals of Physics, 637th edition, Wiley, NY (2001).
2. D. Halliday, R. Resnick and K. S. Krane, Physics, Vols I, II, III, 4th Edition, Wiley, New York (1994).
3. R.P. Feynmann, R.B. Leighton & M. Sands, The Feymann Lectures on Physics Vols I, II, III, Narosa, New Delhi (1998).

ELECTRICAL & ELECTRONIC APPLIANCES	L	T	P	Credits
	3	0	0	3

Course Objective: To know the working of electrical and electronic appliances

UNIT I   Electrical Appliances   15

Transformer - principle - construction details - classification of transformers - testing of transformers Principle and operation of Fans, Wet grinder, Mixie, Water Heater, Electric iron - Refrigerator - Microwave Oven.

UNIT-II   Electronics Appliances   15

Introduction to Semiconductor diode - transistor - LED - LCD - Photo diode - Photo transistor - their uses. Diode rectifiers - half wave and full wave - regulated power supply TV receivers (qualitative study only) - TV antenna's - Dish antenna.

TOTAL HOURS: 30

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Understand the principle and construction details of transformer.
CO2:   Classify and testing of transformers operation in electrical appliances.
CO3:   Construct the half wave and full wave rectifier circuits.
CO4:   Demonstrate the working of electrical and electronic appliances.
CO5:   Analyze the V-I characteristics of phototransistor.

Books for Study:

1. B. L Theraja, A text book in Electrical Technology, S Chand & Co.

2. A. K. Theraja, A text book of Electrical Technology

3. M. G. Say, Performance and Design of AC Machines, CBS Publishers, 3rd Edition, 2005

4. P. K. Palanichamy, Semiconductor Physics and Opto Electronics, Scitech Publications, 2010

5. B. L. Theraja, Basic Electronics, S Chand & Co.

6. Arokh Singh and A. K. Chhabra, Principles of Communication Engineering, S Chand & Co.

	RENEWABLE ENERGY SOURCES	L	T	P	Credits
		3	0	0	3

Course Objective: To understand the concepts of renewable energy sources

UNIT-I 15

Fossil fuels - their limitations - need for renewable energy - non-conventional energy sources - solar energy - wind energy - wind mills - types - biomass - biochemical conversion - biogas generation - ocean thermal energy conversion - geothermal energy tidal energy - fuel cells.

UNIT-II 15

Solar energy - importance - storage of solar energy - solar pond - non-convective solar pond - applications of solar pond - applications of solar energy, solar water heater, flat plate collector - solar distillation - solar cooker, drier - solar greenhouses - solar cell - absorption air conditioning - $LiBr$-H_2O system

TOTAL HOURS: 30

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the basic concepts of renewable energy sources.
CO2: Discuss about the environmental issues and sustainability of renewable energy sources.
CO3: Demonstrate the various resources and technologies for Geothermal and Hydropower energy.
CO4: Demonstrate the recent advancements in ocean energy applications.
CO5: Analyze the various applications of solar energy process.

Books for study:
1. G.D. Rai, Non- Conventional Energy Sources, Khanna Publishers, 2011
2. D.P. Kothari, K.C. Singal & Rakesh Ranjan, Renewable energy sources and emerging Technologies, Prentice Hall of India Pvt. Ltd., New Delhi, 2008.

PHYSICS WORKSHOP SKILL	L	T	P	Credits
	3	0	0	3

Objectives: The aim of this course is to enable the students to familiar and experience with various mechanical and electrical tools through hands-on mode

Introduction: Measuring units. Conversion to SI and CGS. Familiarization with meter scale, Vernier caliper, Screw gauge and their utility. Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains, etc.

Mechanical Skill: Concept of workshop practice. Overview of manufacturing methods:
casting, foundry, machining, forming and welding. Types of welding joints and welding defects. Common materials used for manufacturing like steel, copper, iron, metal sheets, composites and alloy, wood. Concept of machine processing, introduction to common machine tools like lathe, shaper, drilling, milling and surface machines. Cutting tools, lubricating oils. Cutting of a metal sheet using blade. Smoothening of cutting edge of sheet using file. Drilling of holes of different diameter in metal sheet and wooden block. Use of bench vice and tools for fitting. Make funnel using metal sheet.

Electrical and Electronic Skill: Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB. Operation of oscilloscope. Making regulated power supply. Timer circuit, Electronic switch using transistor and relay.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the various mechanical and electrical tools through hands-on mode.

CO2: Identify functions of digital multimeter, CRO and transducers in the measurement of physical variables.

CO3: Demonstrate use of different fitting tools like work holding, marking, cutting, finishing and miscellaneous.

CO4: Identify the use of safety equipment during workshop practice.

CO5: Demonstrate the basic concepts of timer circuit and electronic switch using transistor.

Reference Books:
1. B L Theraja, A text book in Electrical Technology, S. Chand and Company.
2. M.G. Say, Performance and design of AC machines, ELBS Edn.
3. K.C. John, Mechanical workshop practice, 2010, PHI Learning Pvt. Ltd.
4. Bruce J Black, Workshop Processes, Practices and Materials, 2005, 3rd Edn., Editor Newnes [ISBN: 0750660732]

SYLLABUS
ABILITY ENHANCEMENT
COMPULSORY COURSES

	ENVIRONMENTAL STUDIES	L	T	P	Credits
		2	0	0	2

Objective: To inculcate the importance of environmental pollution, preservation of nature and environmental management for human welfare.

UNIT I Multidisciplinary Nature of Environmental Studies **2**
Definition, scope and importance, need for public awareness.

UNIT II Natural Resources **8**
Renewable and non-renewable resources - Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification - Role of an individual in conservation of natural resources- Equitable use of resources for sustainable lifestyles.

UNIT III Ecosystems **6**
Concept of an ecosystem. - Structure and function of an ecosystem Producers, consumers and decomposers. - Energy flow in the ecosystem. Ecological succession. - Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT IV Biodiversity and its Conservation **8**
Introduction–Definition, genetic, species and ecosystem diversity. Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-sports of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT V Environmental Pollution **8**
 Definition, Cause, effects and control measures of a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards. Solid waste Management. Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management- floods, earthquake, cyclone and landslides.

UNIT VI Social Issues and the Environment **7**
 From Unsustainable to Sustainable development, Urban problems related to energy - Water conservation, rain water harvesting, watershed management- Resettlement and rehabilitation of people; its problems and concerns. Case Studies - Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act - Issues involved in enforcement of environmental legislation. Public awareness.

UNIT VII Human Population and the Environment **6**
Population growth, variation among nations. Population explosion – Family Welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health. Case Studies.

UNIT VIII Field Work   **5**

Visit to a local area to document environmental assets river/forest/grassland/hill/mountain, Visit to a local polluted site-Urban/Rural/Industrial/Agricultural, Study of common plants, insects, birds, Study of simple ecosystems-pond, river, hill slopes, etc.

TOTAL HOURS: 50

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Illustrate the knowledge various natural resources and the problems associated.
CO2:   Demonstrate the basic concepts of ecosystems and their types.
CO3:   Understand the different types of pollution and apply it to control the pollution in our environment.
CO4:   Understand the concept of climate change and environmental protection act.
CO5:   Apply the knowledge of family welfare program and human rights.

Text Books:
1. De AK, Environmental Chemistry, Wiley Eastern Ltd.
2. BharuchaErach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, India.
3. Brunner RC, 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480pgs.
4. Clark RS, Marine Pollution, Clanderson Press, Oxofrd (TB).

Reference Books:
1. Agarwal KC, 2001. Environmental Biology, Nidi Publishers Ltd. Bikaner.
2. Gleick HP, 1993. Water in Crisis, Pacific Institute for Studies in Development, Environment and Security. Stockholm Environmental Institute, Oxford University Press, 473pgs.
3. Heywood VH, and Watson RT, 1995. global Biodiversity Assessment. Cambridge University Press 1140pgs.
4. Jadhav H and Bhosale VM, 1995. Environmental Protection and Laws. Himalaya Publishing House, Delhi 284pgs.
5. Mckinney ML and Schoch RM, 1996. Environmental Science Systems and Solutions. Web enhanced edition, 639pgs.
6. Miller TG, Jr. Environmental Science, Wadsworth Publishing CO. (TB)

SYLLABUS
SKILL ENCHANCEMENT
COURSES

	SOFT SKILL - I	L	T	P	Credits
		0	0	0	2

Course Objective

- ➢ The ability to create an open environment for communication
- ➢ An understanding of other people communication styles and needs
- ➢ To create an environment for open discussion and ongoing dialogue for communication success.

Unit I   Reading Comprehension and Vocabulary   08

Definitions of reading – types of reading – oral reading – silent reading – reading process – classification of reading – nature of reading – Filling in the blanks – Cloze Exercises –Vocabulary building – Reading and answering question.

Unit II Listening and Answering Question   08

Listening process – speaker – hearer – types of listening – transitional listening – critical listening – recreational listening – listening for appreciation – selective listening – intensive listening- extensive listening – listening and sequencing sentences – filling in the blanks – listening and answering questions.

Unit III   Group Discussion   08

Introduction – Why GD Part of a selection process – Structure of a GD-Strategies in GD – Team work – body language – Debating various points of views – interaction with peers.

Unit IV   Conversations   08

Introducing oneself and others, narrating events – making telephonic conversation – Giving instruction – Giving instruction- Expressing purposes and functions- obligation and preferences, Accepting offers and Counseling Face to face Conversations

Unit V Self – Introduction and Role Play   08

Introduction self and greetings- asking for information- offerings- requisitions- inviting – vocabulary building- asking for description.

Total: 40 hrs

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Prioritize power of understanding and aids assimilation of vocables.
CO2: Develop comprehensive knowledge through listening leading to answering questions.
CO3: Build observation power and infuse self-confidence through group discussions.
CO4: Identify methodology for befitting constructional ability.
CO5: Experiments with inward looking and visualization of the 'otherness' of situations.

Text Books:
1.   Barun K. Mitra, "Personality Development and Soft Skills". Oxford University Press. New Delhi. 2011.
2.   S.P. Sharma, "Personalilty Development", Pustaq Mahal. New Delhi. 2010.

Reference Books:
1.   Meenakshi Raman and Sangeetha Sharma, "Technical Communication", Oxford University Press. New Delhi, 2009.
2.   A.S. Hornby: "Oxford Advanced Learner's Dictionary of Current English", Oxford University Press, 2007

	SOFT SKILL - II	L	T	P	Credits
		0	0	0	2

Course Objective

➢ To provide basic information about presentation skill and train the students for letter writing, creation of resume and develop the interview skills.
➢ To provide information about the Process, types and patterns of communication

Unit I   Presentation Skills   08

General presentation methods and developing presentation skill

Unit II Soft skills (Time Management, Stress Management and Body Language)   08

Time management: Importance, Plan and Execution, Default reason and rectification methods. Stress Management: Stress Impacts over Efficiency and how to manage. Body Language: Its importance and need

Unit III   Resume / Report / Letter Writing   08

Resume: Basic components of a resume, Preparation of a resume, Types of resume Report: How to prepare reports, reports components and structure Letter writing: types of letters, framing letters, basic structure, how to draft a letter

Unit IV   Frequently asked Questions   08

Unit V   Interview Skills   08

Aims of Interview expectations and how to fulfill, developing skills

Total: 40 hrs

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Illustrate the essential of presentation skills, thoughts, structure, voice modulation, audience analysis and body language.
CO2:   Utilize the psychological skills pertaining to time management, articulation, assertion and stress management.
CO3:   Construct methodology for preparation of resume, reports, business letters and email communication
CO4:   Appraise learners with varied skills needed for expose to interviews.
CO5:   Categorize the nature of questions asked usually in interviews.

Text Books:
1.   Barun K. Mitra, "Personality Development and Soft Skills". Oxford University Press. New Delhi. 2011.
2.   S.P. Sharma, "Personalilty Development", Pustaq Mahal. New Delhi. 2010.

Reference Books:
1.   Meenakshi Raman and Sangeetha Sharma, "Technical Communication", Oxford University Press. New Delhi, 2009.
2.   A.S. Hornby: "Oxford Advanced Learner's Dictionary of Current English" Oxford University Press, 2007

	NATIONAL SERVICE SCHEME - I	L	T	P	Credits
		0	0	0	2

Unit -I: Introduction and Basic Concepts of NSS   0 4
- a) History, philosophy, aims & objectives of NSS
- b) Emblem, flag motto, song, badge etc.,
- c) Organizational structure, roles and responsibilities of various NSS
  Functionaries

Unit-II: NSS Programmes and Activities   10
- a) Concept of regular activities, special camping, Day Camps
- b) Basis of adoption of village/slums, Methodology of conducting Survey
- c) Financial pattern of the scheme
- d) Other youth prog./schemes of GOI
- e) Coordination with different agencies f)
  Maintenance of Diary

Unit-III: Understanding Youth   05
- a) Definition, profile of youth, categories of youth
- b) Issues, challenges and opportunities for youth
- c) Youth as an agent of social change

Unit-IV: Community Mobilization   09
- a) Mapping of community stakeholders
- b) Designing the message in the context of the problem and culture of the community
- c) Identifying methods of mobilization
- d) Youth – adult partnership

Unit -V: Volunteerism and Shramdan   07
- a) Indian Tradition of volunteerism
- b) Needs &Importance of volunteerism
- c) Motivation and Constraints of Volunteerism
- d) Shramdan as a part of volunteerism

Total: 35 hrs

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the basic concepts of NSS.

CO2: Identify the organizational structure, roles and responsibilities of various NSS functionaries.

CO3: Utilize the concept of regular activities, special camping and day camp.

CO4: Analyze the issues, challenges and opportunities for youth.

CO5: Design the message in the context of the problem and culture of the community.

	NATIONAL SERVICE SCHEME - II	L	T	P	Credits
		0	0	0	2

Unit-I: Importance and Role of Youth Leadership　　　　　**06**

   a) Meaning and types of leadership

   b) Qualities of good leaders; traits of leadership

   c) I m p o r t a n c e and role of youth leadership

Unit-II: Life Competencies　　　　　**11**

   a) Definition and importance of life competencies

   b) Communication

   c) Inter Personal

   d) Problem – solving and decision-making

Unit-III: Social Harmony and National Intergration　　　　　**09**

   a) Indian history and culture

   b) Role of youth in peace-building and conflict resolution

   c) Role of youth in Nation building

Unit-IV: Youth Development Programmes in India　　　　　**09**

   a) National Youth Policy

   b) Youth development Programmes at the National level, State Level and Voluntary sector

   c) Youth-focused and Youth –led organizations

Total: 35 hrs

Project work /Practical

   Conducting Surveys on special theme and preparing a report thereof.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:　Develop competence required for collective existence and sharing of responsibilities.
CO2:　Identify the needs and problems of the community and involve them in the solution of the problems.
CO3:　Develop leadership qualities and democratic attitude.
CO4:　Utilize their knowledge in finding practical solution to individual and community problems.
CO5:　Develop capacity to meet emergencies and natural disaster.

	NATIONAL SERVICE SCHEME - III	L	T	P	Credits
		0	0	0	2

Unit – I: Citizenship 07
   a) Basic Features of constitution of India
   b) Fundamental Rights and Duties
   c) H u m a n Rights
   d) Consumer awareness and the legal rights of the consumer RTI

Unit–II: Family and Society 06
   a) Concept of family, community, (PRIs and other community-based Organizations and society
   b) Growing up in the family – dynamics and impact
   c) Human Values
   d) IV Gender justice

Unit – III: Health, Hygiene & sanitation 07
   a) Definition, needs and scope of health education
   b) Food and Nutrition
   c) Safe drinking water, waterborne diseases and sanitation (swatch Bharat Abhiyan)
   d) National Health Programme
   e) Reproductive Health

Unit – IV: Youth Health 06
   a) Healthy lifestyles
   b) HIV AIDS, Drugs and substance abuse
   c) Home Nursing
   d) First Aid

Unit – V: Youth and Yoga 09
a) History, Philosophy and concept of yoga
b) Myths and misconceptions about yoga
c) Different yoga traditions and their Impacts
d) Yoga as a preventive, Primitive and curative method
e) Yoga as a tool for healthy; lifestyle

Total: 35 hrs

Project work / practical 40 marks
Preparation of research project report.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Develop among themselves a sense of social and civic responsibility.
CO2:   Utilize the skills in mobilizing community participation
CO3:   Develop competence in group living.
CO4:   Understand the needs and problems of the community.
CO5:   Adapt the different yoga traditions and their impacts.

	ELECTRICAL & ELECTRONIC APPLIANCES	L	T	P	Credits
		3	0	0	3

Course Objective: To know the working of electrical and electronic appliances

UNIT I   Electrical Appliances   15

Transformer - principle - construction details - classification of transformers - testing of transformers
Principle and operation of Fans, Wet grinder, Mixie, Water Heater, Electric iron - Refrigerator -
Microwave Oven.

UNIT-II   Electronics Appliances   15

Introduction to Semiconductor diode - transistor - LED - LCD - Photo diode - Photo transistor - their
uses. Diode rectifiers - half wave and full wave - regulated power supply TV receivers (qualitative study
only) - TV antenna's - Dish antenna.

TOTAL HOURS: 30

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Understand the principle and construction details of transformer.
CO2:   Classify and testing of transformers operation in electrical appliances.
CO3:   Construct the half wave and full wave rectifier circuits.
CO4:   Demonstrate the working of electrical and electronic appliances.
CO5:   Analyze the V-I characteristics of phototransistor.

Books for Study:

1. B. L Theraja, A text book in Electrical Technology, S Chand & Co.

2. A. K. Theraja, A text book of Electrical Technology

3. M. G. Say, Performance and Design of AC Machines, CBS Publishers, 3rd Edition, 2005

4. P. K. Palanichamy, Semiconductor Physics and Opto Electronics, Scitech Publications, 2010

5. B. L. Theraja, Basic Electronics, S Chand & Co.

6. Arokh Singh and A. K. Chhabra, Principles of Communication Engineering, S Chand & Co.

	PHYSICS WORKSHOP SKILL	L	T	P	Credits
		3	0	0	3

Objectives: The aim of this course is to enable the students to familiar and experience with various mechanical and electrical tools through hands-on mode

Introduction: Measuring units. Conversion to SI and CGS. Familiarization with meter scale, Vernier calliper, Screw gauge and their utility. Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains, etc.

Mechanical Skill: Concept of workshop practice. Overview of manufacturing methods:
casting, foundry, machining, forming and welding. Types of welding joints and welding defects. Common materials used for manufacturing like steel, copper, iron, metal sheets, composites and alloy, wood. Concept of machine processing, introduction to common machine tools like lathe, shaper, drilling, milling and surface machines. Cutting tools, lubricating oils. Cutting of a metal sheet using blade. Smoothening of cutting edge of sheet using file. Drilling of holes of different diameter in metal sheet and wooden block. Use of bench vice and tools for fitting. Make funnel using metal sheet.

Electrical and Electronic Skill: Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB. Operation of oscilloscope. Making regulated power supply. Timer circuit, Electronic switch using transistor and relay.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the various mechanical and electrical tools through hands-on mode.

CO2: Identify functions of digital multimeter, CRO and transducers in the measurement of physical variables.

CO3: Demonstrate use of different fitting tools like work holding, marking, cutting, finishing and miscellaneous.

CO4: Identify the use of safety equipment during workshop practice.

CO5: Demonstrate the basic concepts of timer circuit and electronic switch using transistor.

Reference Books:
1. B L Theraja, A text book in Electrical Technology, S. Chand and Company.
2. M.G. Say, Performance and design of AC machines, ELBS Edn.
3. K.C. John, Mechanical workshop practice, 2010, PHI Learning Pvt. Ltd.
4. Bruce J Black, Workshop Processes, Practices and Materials, 2005, 3rd Edn., Editor Newnes [ISBN: 0750660732]

SYLLABUS
LANGUAGE COURSES

தமிழ்மொழி, இலக்கியவரலாறு – அறிமுகம்	L	T	P	Credits
	5	0	0	5

நோக்கம்: தமிழ்மொழி மற்றும் இலக்கியத்தின் வரலாற்றை அறிமுகம் செய்யும் நோக்கில் இப்பாடம் வடிவமைக்கப்பட்டுள்ளது. தமிழ்மொழியின் வரலாற்றை அறிவியல் கண்ணோட்டத்துடனும் மொழிக்குடும்பங்களின் அடிப்படையிலும்விளக்குகிறது. சங்க இலக்கியம் தொடங்கி, இக்கால இலக்கியம் வரையிலான தமிழிலக்கிய வரலாற்றை இலக்கிய வரலாறு அறிமுகப்படுத்துகின்றது. அரசு வேலை வாய்ப்பிற்கான போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையிலும் இப்பாடம் அமைந்துள்ளது.

அலகு 1   தமிழ் மொழி வரலாறு   13 மணி நேரம்
மொழிக்குடும்பம் - இந்திய மொழிக்குடும்பங்கள் - இந்திய ஆட்சி மொழிகள் - திராவிட மொழிக்குடும்பங்கள் - திராவிட மொழிகளின் வகைகள் –திராவிட மொழிகளின் சிறப்புகள் - திராவிட மொழிகளின் வழங்கிடங்கள் - திராவிட மொழிகளுள் தமிழின் இடம் - தமிழ்மொழியின் சிறப்புகள் - தமிழ் பிறமொழித் தொடர்புகள்.

அலகு 2   சங்க இலக்கியம்   12 மணி நேரம்
சங்க இலக்கியம் - எட்டுத்தொகை - நற்றிணை - குறுந்தொகை - ஐங்குறுநூறு - பதிற்றுப்பத்து - பரிபாடல் - கலித்தொகை - அகநானூறு - புறநானூறு - பத்துப்பாட்டு – திருமுருகாற்றுப்படை – சிறுபாணாற்றுப்படை – பெரும்பாணாற்றுப்படை – பொருநராற்றுப்படை – மலைபடுகடாம் – குறிஞ்சிப்பாட்டு, முல்லைப்பாட்டு, பட்டினப்பாலை –நெடுநல்வாடை – மதுரைக்காஞ்சி.

அலகு 3   அற இலக்கியங்களும் காப்பியங்களும்   11 மணி நேரம்
களப்பிரர் காலம் விளக்கம் – நீதி இலக்கியத்தின் சமூகத்தேவை - பதினெண்கீழ்க்கணக்கு நூல்கள் அறிமுகம் - திருக்குறள், நாலடியார்.
காப்பியங்கள் – ஐம்பெருங்காப்பியங்கள் மற்றும் ஐஞ்சிறுங்காப்பியங்கள் அறிமுகம்– காப்பிய இலக்கணம் - சிலப்பதிகாரம் – மணிமேகலை – சீவகசிந்தாமணி – வளையாபதி – குண்டலகேசி.

அலகு 4   பக்தி இலக்கியங்களும் சிற்றிலக்கியங்களும்   11 மணி நேரம்
தமிழகப் பக்தி இயக்கங்கள் - பக்தி இலக்கியங்கள் - சைவ இலக்கியம் - நாயன்மார்கள் அறுபத்து மூவர் - சமயக்குரவர் நால்வர் - வைணவ இலக்கியம் - பன்னிரு ஆழ்வார்கள் - முதல் மூன்று ஆழ்வார்கள்.
சிற்றிலக்கியக் காலம் - சிற்றிலக்கியங்கள் - வகைகள் - பரணி - கலிங்கத்துப்பரணி - குறவஞ்சி - குற்றாலக் குறவஞ்சி - பிள்ளைத்தமிழ் - மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தூது - தமிழ்விடு தூது - கலம்பகம் - நந்திக்கலம்பகம் - பள்ளு - முக்கூடற்பள்ளு.

அலகு 5   இக்கால இலக்கியங்கள்   13 மணி நேரம்

நவீன காலம் – நவீன இலக்கியம் – உள்ளடக்கம் - புதுக்கவிதை - தோற்றமும் வளர்ச்சியும்- நாவல் - முதல் மூன்று நாவல்கள் – நாவலின் வகைகள் - பொழுது போக்கு நாவல்கள் - வரலாற்று நாவல்கள் - சமூக நாவல்கள் - இக்கால நாவல்கள் - மொழிபெயர்ப்பு நாவல்கள் - சிறுகதை –வகைகளும் வளர்ச்சியும் – நாடகம் –

காலந்தோறும் நாடகங்கள் - புராண இதிகாச நாடகங்கள் - சமூக நாடகங்கள் - வரலாற்று நாடகங்கள் – மொழிபெயர்ப்பு நாடகங்கள் - நகைச்சுவை நாடகங்கள்.

மொத்தம்: 60 மணி நேரம்

கல்வித்திட்டப் பயன்கள் (Programme Outcome): தமிழிலக்கிய வரலாற்றை முழுவதும் அறிமுக நிலையில் அறிந்துகொள்ளும் வகையில் இப்பாடத்திட்டம் பயனுடையதாக அமைகிறது. அரசுத் தேர்வுகள், பொது அறிவுப் போட்டிகள் போன்ற தமிழ் சார்ந்த இயங்குதளங்களில் இந்தப் பாடத்திட்டம் பயன்பாடுடையதாக அமையும்.

பார்வை நூல்கள்
1. அகத்தியலிங்கம். ச., "திராவிடமொழிகள் தொகுதி 1", மணிவாசகர் பதிப்பகம், முதற்பதிப்பு, 1978.
2. சக்திவேல். சு., "தமிழ்மொழி வரலாறு", மணிவாசகர் பதிப்பகம், முதற்பதிப்பு 1998.
3. பூவண்ணன், " தமிழ் இலக்கிய வரலாறு", சைவசித்தாந்த நூற்பதிப்புக் கழகம், முதற்பதிப்பு, 1998.
4. வரதராசன். மு., "இலக்கிய வரலாறு",சாகித்ய அகாதெமி, ஒன்பதாம் பதிப்பு, 1994.
5. விமலானந்தம். மது.ச., "இலக்கிய வரலாறு", பாரி நிலையம், மறுபதிப்பு, 2008.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Recall and recognize heritage and culture of Tamils through History of Tamil Language.
CO2:   Interpret the cultural life style of Ancient Tamils.
CO3:   Evaluate social and individuals moral value after studying Epics and Ethics Literature.
CO4:   Build the humanistic concept and moral life skills after studying divine and minor Literature.
CO5:   Improve their own creativity and writing skills after studying history of Modern Tamil Literature.

	தமிழிலக்கியம்	L	T	P	Credits
		5	0	0	5

நோக்கம்: சங்க காலம் தொடங்கி தற்காலம் வரையிலும் தமிழில் உள்ள படைப்பிலக்கியங்களை இப்பாடம் அறிமுகம் செய்கின்றது. தமிழ் இலக்கியத்தில் தேர்ந்தெடுக்கப்பட்ட மிக முக்கியமான செய்யுட்கள், கவிதைகள், கதைகள், உரைநடை ஆகியவற்றைக்கொண்டு இப்பாடம் கட்டமைக்கப்பட்டுள்ளது. மாணாக்கரிடம் இலக்கியத் தேடலை உருவாக்குவதும், தற்சார்புடைய அறிவை மேம்படுத்துவதும் இப்பாடத்தின் நோக்கமாகும்.

அலகு 1   செவ்வியல்இலக்கியங்கள்   12 மணிநேரம்

திருக்குறள்- அன்புடைமை, ஒழுக்கமுடைமை, பெரியாரைத்துணைக்கோடல் –மூன்று அதிகாரங்கள் முழுமையும்.
புறநானூறு- பாடல் எண்: 18, 55, 182, 183, 192 –ஐந்து பாடல்கள்.
குறுந்தொகை- பாடல் எண்: 2, 167, 27, 202, 184 - ஐந்து பாடல்கள்.

அலகு 2   காப்பியங்கள்   12 மணிநேரம்

சிலப்பதிகாரம்- கனாத்திறம் உரைத்தக் காதை முழுவதும்.
மணிமேகலை- பவத்திறம் அறுக எனப் பாவை நோற்ற காதை முழுவதும்.
கம்பராமாயணம் - மந்தரைச் சூழ்ச்சிப்படலம் (தேர்ந்தெடுக்கப்பட்ட ஒன்பது பாடல்கள்).

அலகு 3   கவிதையும்புதுக்கவிதையும்   11 மணிநேரம்

பாரதிதாசனின் 'தமிழியக்கம்' -(i) நெஞ்சு பதைக்கும் நிலை - (ii) இருப்பதைவிட இறப்பது நன்று - இரண்டு கவிதைகள்.
ஈரோடு தமிழன்பனின், "அந்த நந்தனை எரித்த நெருப்பின் மிச்சம்" என்னும் தொகுதியில் இடம்பெற்றுள்ள 'விடிகிறது' என்னும் புதுக்கவிதை.

அலகு 4   சிறுகதைகள்   12 மணிநேரம்

தி. ஜானகிராமனின் 'சக்தி வைத்தியம்'
கி. ராஜநாராயணனின்'கதவு' - இரண்டு கதைகள்

அலகு 5   உரைநடை   13 மணிநேரம்
வைரமுத்துஎழுதிய 'சிற்பியேஉன்னைச்செதுக்குகிறேன்' முழுவதும்

மொத்தம்: 60 மணிநேரம்

கல்வித்திட்டப் பயன்கள் (Programme Outcome): சங்க இலக்கியம் தொடங்கி இக்கால இலக்கியம் வரையில் அமைந்த இலக்கியங்களின் அறிமுகமாக ஒருசில இலக்கியங்களில் இருந்து பாடப்பகுதிகள் தேர்வு செய்யப்பட்டு தமிழிலக்கியம் என்ற தலைப்பில் மாணவர்களுக்குக் கற்பிக்கப்படுகிறது. இவை இலக்கிய வெளிப்பாட்டுத் தன்மையை உணர்த்துவதாக அமைகிறது.

பாடநூல்கள்

1. இரவிச்சந்திரன். சு. (ப.ஆ), "செய்யுள்திரட்டு", வேல்ஸ்பல்கலைக்கழகம், முதற்பதிப்பு, 2008.
2. வைரமுத்து. இரா., "சிற்பியேஉன்னைச்செதுக்குகிறேன்", திருமகள்நிலையம், பதினேழாம்பதிப்பு, 2007.

பார்வைநூல்கள்

1. பாலச்சந்திரன்.சு., "இலக்கியத்திறனாய்வு", நியூசெஞ்சுரிபுக்ஹவுஸ், பத்தாம்பதிப்பு, 2007.
2. மாதையன்.பெ., "தமிழ்ச்செவ்வியல்படைப்புகள்", நியூசெஞ்சுரிபுக்ஹவுஸ், முதல்பதிப்பு, 2009.
3. வரதராசன்.மு., "குறள்காட்டும்காதலர்", பாரிநிலையம், மறுபதிப்பு, 2005.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Measure human mind through the studying of Tamil classical literature in the aspect of moral value.
CO2:   Justify the contemporary social issues through studying Tamil Epics.
CO3:   Build the life skills after studying of the poetry.
CO4:   Develop narrative skill after reading short stories.
CO5:   Improve their own style of writing after studying SirpiyeUnnaiSethukkukiren essays collection.

	பயன்பாட்டுத்தமிழ்	L	T	P	Credits
		5	0	0	5

நோக்கம்: தற்கால அன்றாடத்தேவைக்குரிய வகையில் தமிழ்மொழியைச் செம்மையாகப் பயன்படுத்த வேண்டும் என்னும் நோக்கில் இப்பாடம் உருவாக்கப்பட்டுள்ளது. மாணாக்கரின் வேலைவாய்ப்பு நேர்காணல்கள் மற்றும் குழு உரையாடல்களை எதிர்கொள்வதற்கேற்ற பேச்சுத்திறன் மேம்பாடு, செய்தித்தாள்களை நுட்பமாக அணுகும்விதம், சிறந்த கடிதங்களை எழுதுவதற்கான பயிற்சி போன்ற பயன்பாடு சார்ந்த மொழிப்பயிற்சியை இப்பாடம் அளிக்கின்றது.

அலகு 1 மொழி   11 மணிநேரம்
பிழைநீக்கிஎழுதுதல் - ஒற்றுப்பிழைநீக்கிஎழுதுதல் - தொடர்பிழைநீக்கிஎழுதுதல் - ஒற்றுமிகும்இடங்கள் - ஒற்றுமிகாஇடங்கள் - பிறமொழிச்சொற்களைநீக்கிஎழுதுதல் – பயிற்சிகள்.

அலகு 2 பேச்சு   13 மணிநேரம்
பேச்சுத்திறன் – விளக்கம் – பேச்சுத்திறனின்அடிப்படைகள் - வகைகள் – மேடைப்பேச்சு - உரையாடல் - குழுவாகஉரையாடல் – பயிற்சிகள்.
தலைவர்களின்மேடைப்பேச்சுகள் - பெரியார் - அண்ணா - கலைஞர்.

அலகு 3 எழுதுதிறன்   12 மணிநேரம்
கலைச்சொல்லாக்கம் - தேவைகள் – கலைச்சொற்களின் பண்புகள் – கலைச்சொல்லாக்கத்தில் தவிர்க்க வேண்டியவை – அறிவியல் கலைச்சொற்கள்.

கடிதம் - வகைகள் - அலுவலகக் கடிதங்கள் - பயிற்சி – அறிஞர்களின் கடிதங்கள் – கடிதங்களின் வழி கற்பித்தல் – சில அறிஞர்களின் கடிதங்கள் - நேரு...,

அலகு 4 மொழிபெயர்ப்பு   13 மணிநேரம்
மொழிபெயர்ப்பு அடிப்படைக் கோட்பாடுகள் – மொழிபெயர்ப்பு முறைகள் – மொழிபெயர்ப்பாளரின் தகுதிகள்.
மொழிபெயர்ப்பு வகைகள் – சொல்லுக்குச் சொல் மொழிபெயர்த்தல் - தழுவல் – கட்டற்ற மொழிபெயர்ப்பு - மொழியாக்கப்படைப்பு – இயந்திர மொழிபெயர்ப்பு - கருத்துப்பெயர்ப்பு – மொழிபெயர்ப்பு நடை – மொழிபெயர்ப்பு சிக்கல்களும் தீர்வுகளும்.
பயிற்சி: அலுவலகக் கடிதங்களைமொழிபெயர்த்தல் (ஆங்கிலத்திலிருந்து தமிழுக்கு).

அலகு 5 இதழியல்பயிற்சி   11 மணிநேரம்
இதழ்களுக்குத் தலையங்கம் எழுதுதல் – நூல் மதிப்புரை எழுதுதல் – சாதனையாளரை நேர்காணல் – நிகழ்ச்சியைச் செய்தியாக மாற்றுதல்.

மொத்தம்: 60 மணிநேரம்

கல்வித்திட்டப் பயன்கள் (Programme Outcome): நவீனக் காலத்திற்கும் தேவைக்கும் ஏற்றவாறு மொழியின் தேவையை மாணவர்கள் சரிவர அறிந்து கொள்ள வேண்டும் என்ற நோக்கில் பயன்பாட்டுத் தமிழ் என்ற பாடப்பகுதி அமைக்கப்பட்டுள்ளது. தவறின்றித் தமிழ் எழுதவும் அறிவியல் கலைச் சொற்களை உருவாக்கவும் பேச்சுத் திறனை வளர்ப்பதற்காகவும் மொழிபெயர்ப்பு, இதழியல் சார்ந்த அறிவினைப்

பெறுவதற்கும் அந்தந்த துறை சார்ந்த பணிகளில் வேலை வாய்ப்பு பெறுவதற்கும் இப்பாடத்திட்டம் பயன்படுகிறது.

பார்வைநூல்கள்

1. ஈஸ்வரன்.ச., சபாபதி.இரா., "இதழியல்", பாவைபப்ளிகேஷன்ஸ், முதற்பதிப்பு, 2004.

2. ஈஸ்வரன்.ச., "மொழிபெயர்ப்பியல்", பாவைபப்ளிகேஷன்ஸ், முதற்பதிப்பு, 2005.

3. எட்கர்தார்ப், ஷோவிக்தார்ப், "நேர்முகத்தேர்வில்வெற்றிபெற", கிழக்குப்பதிப்பகம், இரண்டாம்பதிப்பு, 2009.

4. சுப்பிரமணியன்.பா.ரா., ஞானசுந்தரம்.வ., (ப.ஆ)"தமிழ்நடைக் கையேடு", இந்தியமொழிகளின் நடுவண் நிறுவனம், மைசூர் மொழி அறக்கட்டளை மற்றும் தஞ்சைத்தமிழ்ப் பல்கலைக்கழகம் - வெளியீடு, நான்காம் மீள்பதிப்பு, 2010.

5. சுப்புரெட்டியார்.ந., "தமிழ்பயிற்றும்முறை", மெய்யப்பன் பதிப்பகம், ஐந்தாம் பதிப்பு, 2006.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Utilizing fundamental Tamil grammar in their practical life.

CO2:   Improve their oratorical skill after studying of concept of oratory.

CO3:   Develop their own style of Terminology after studying the Nomenclature.

CO4:   Translate English passage to Tamil.

CO5:   Apply their knowledge into journals, articles writings.

	தமிழர்நாகரிகமும்பண்பாடும்	L	T	P	Credits
		5	0	0	5

நோக்கம்: பண்டைத் தமிழரின் வாழ்வியல் நெறிகள் இயல்பானதும் இயற்கையோடு இணங்கிச் செல்வதுமாகும்; மிகவும் பழமையானதும் பண்பட்டதுமாகும். அன்பான அக வாழ்க்கையைக்கூட செம்மையாகத் திட்டமிட்டுள்ளனர். பொழுதுபோக்கு, போர்முறைகள், கலை, சமயம், அரசியல், அறிவியல் என அனைத்திலும் தமிழர் சிறந்து விளங்குவதை விளக்கும் பாடமாக இது அமைந்துள்ளது. அரசு வேலை வாய்ப்பிற்கான போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையிலும் இப்பாடம் அமைந்துள்ளது.

அலகு 1 நாகரிகம், பண்பாடு   12 மணிநேரம்
சொற்பொருள்விளக்கம் - பண்டைத்தமிழர்வாழ்வியல் - அகம் - களவு - கற்பு - குடும்பம் - விருந்தோம்பல் - உறவுமுறைகள் - சடங்குகள் - நம்பிக்கைகள் - பொழுதுபோக்கு - புறம் - போர்முறைகள் - நடுகல்வழிபாடு - கொடைப்பண்பு.

அலகு 2 கலைகள்   12 மணிநேரம்
சிற்பம் - ஓவியம் - இசை - கூத்து - ஒப்பனை - ஆடைஅணிகலன்கள்.

அலகு 3 சமயம்   12 மணிநேரம்
சைவம் - வைணவம் - சமணம், பௌத்தம்வெளிப்படுத்தும்பண்பாடு.

அலகு 4 அரசியல்   12 மணிநேரம்
அரசுஅமைப்பு - ஆட்சிமுறை - உள்நாட்டுவணிகம் - வெளிநாட்டுவணிகம் - வரிவகைகள் - நாணயங்கள் - நீதிமுறை.

அலகு 5 அறிவியல்   12 மணிநேரம்
கல்வி - வேளாண்மை - வானியல்அறிவு - மருத்துவம் - கட்டிடக்கலை.

மொத்தம்: 60 மணிநேரம்

கல்வித்திட்டப் பயன்கள் (Programme Outcome): தமிழர்களின் வாழ்வியல் முறைகள், தொன்மை, நாகரிகம், பண்பாட்டு முறைகளைப் பற்றி இலக்கியங்களின் வழித் தெரிந்துகொள்ளும் நோக்கில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது. அரசுப் பணி சார்ந்த தேர்வுகளுக்கும், போட்டித் தேர்வுகளுக்கும் இப்பாடப்பகுதி உறுதுணையாக அமையும்.

பார்வைநூல்கள்
1. கே.கே. பிள்ளை, "தமிழகவரலாறு: மக்களும் பண்பாடும்", உலகத் தமிழாராய்ச்சி நிறுவனம், மீள்பதிப்பு, 2009.
2. பக்தவச்சல பாரதி, "தமிழர் மானிடவியல்", அடையாளம், இரண்டாம் பதிப்பு, 2008.
3.தட்சிணாமூர்த்தி. அ., "தமிழர் நாகரிகமும்பண்பாடும்",யாழ் வெளியீடு, மறுபதிப்பு, 2011.
4. தேவநேயப்பாவாணர். ஞா., "பழந்தமிழர் நாகரிகமும் பண்பாடும்", தமிழ்மண் பதிப்பகம்,
  சென்னை.
5. வானமாமலை.நா., "தமிழர் வரலாறும் பண்பாடும்", நியூ செஞ்சுரி புக் ஹவுஸ்,
  ஆறாம்பதிப்பு, 2007.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Re-Construct Tamil culture and civilization in the aspect of life style of ancient Tamils.

CO2: Formulated their new methods of fine arts through the sprite of ancient art of Tamils.

CO3: Find out the solutions for the problems of life through the philosophical ideology of Tamil religions.

CO4: Acquire the Knowledge and understanding theories of political system.

CO5: Formulate the art of life through Tamil traditional scientific approach.

	HINDI - I	**L**	**T**	**P**	**Credits**
		5	**0**	**0**	**5**

Unit I   -   'Mamta', letter writing, Technical words.

   Aim   - Through the story students will be familiar with the writing style of great writer "sri Jayashankar Prasad", & can understand the situation of country during Mughal period.

Unit II   -   'Yogyata aur vyavasaya kaa chunaav', letter writing, Technical words.

   Aim   - To make the children understand the importance of selecting a profession according to one's own interest.

Unit III   -   'Rajnithi kaa bantwara', letter writing, Technical words.

   Aim   -   To describe the present situation; politician's behavior & their self-oriented activities.

Unit IV   -   'computer: nayi kranthi ki dastak', letter writing, Technical words

   Aim   -   To explain the importance of computer in daily life in all the fields.

Unit V   -   Raspriya, letter writing, Technical words

   Aim   -   This story helps the students to understand the Writing style of writer "Fanishwarnathrenu" who is well known for his village type Stories.

Training them different types of letters& technical words   will help the students to understand the official work in Hindi.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Understand the situation of country during Mughal period
CO2:   Understand the importance of selecting a profession according to one's own interest.
CO3:   Describe the present situation politician's behaviour & their self oriented activities.
CO4:   Explain the importance of computer in daily life in all the fields.
CO5:   Understand the writing style of writer "Fanishwarnath renu" who is well known for his village type Stories.

	HINDI - II	**L**	**T**	**P**	**Credits**
		5	**0**	**0**	**5**

Unit I -   'Pus ki raath'(kahani), Translation

Aim   This story explains the problems faced by the farmers

'Upanyas samrat Premchand' describes the life of a

poor farmer who represents present day's situation

Aim   **'Das hazar'(ekanki),Translation**

Author 'Uday Shankar bhatt' criticized the rich&stingy person's behaviour and

explains the importance of humanvalues in a humorous manner

By translating the English passage into Hindi, students learn the rules which

should be followed while translation.

Unit II -   'vaapasi'(kahani), Translation

Aim   Female writer'Usha priyamvada 'describes the mentality of a retired person in a

beautiful manner

Aim   **'Akhbaari vijnapan'(ekanki), Translation**

This humorous story written by 'chiranchith'points out the problems occur due to

Carelessness & lack of communication.

Unit III -   'Akeli'(kahani), Translation

Aim   Writer 'Mannu bhandari'describes the condition of middle aged woman left

lonely who longs only for love &affection&nothing else.

Aim   **'Raat ke raahi', (ekanki), Translation**

'Vrajabhushan' shows the clear picture of cunning woman and creates

Awareness

Unit IV -   'Parda'(kahani), Translation

Aim   Written by 'Yashpal', this story brings the clear picture of problems

Faced by a poor muslim family.

Aim   '**Maim bhi maanav huum'(ekanki), Translation**

Author 'vishnu prabhakar' describes the kalinga war & reasons behind

samrat Ashok's change of mind.

Unit V -   'Sharandata'(kahani), Translation

Aim   This story written by 'Anjeya explains the situation of Indian people

who lived in Pakistan region after separation .

Aim   **'Yah meri janma bhumi hai'(ekanki), Translation**

'Harikrishna premi' points out the patriotism of a british girl who

Was born in India & also the country's condition at that time.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Describe the life of a poor farmer who represents present day's situation
CO2:   Describe the mentality of a retired person in a beautiful manner.
CO3:   Explain the condition of middle aged woman left lonely who longs only for love & affection & nothing
        else.
CO4:   Show the clear picture of problems Faced by a poor Muslim family.
CO5:   Explain the situation of Indian people who lived in Pakistan region after separation.

	HINDI – III	**L**	**T**	**P**	**Credits**
		5	**0**	**0**	**5**

Unit I - 'Kabir ke pad', Hindi Sahitya ka ithihas

     Aim - Students can understand the writing style of Kabir&
          also learn valuable messages.

Unit II - 'Sur ke pad', Hindi Sahitya ka ithihas

     Aim - To learn the precious poems of Surdas & SriKrishna
          Leela.

Unit III - Thulsi ke pad, Hindi Sahitya ka ithihas

     Aim - Students get the opportunity to learn the poems of
          Ram bhakthi poet Thulssi das

Unit IV - Rahim ke pad, Hindi Sahitya ka ithihas

     Aim - The poems of Rahim are different &valuable and
          students will get confidence &ideas to tackle the
          problems ahead.

Unit V - Bihari ke pad, Hindi Sahitya ka ithihas

     Aim - Students will understand the writing style of Bihari &
          the important messages .

          The aim of teaching 'Hindi Sahitya ka ithihas' is to make them
          understand the different periods of growth of Hindi Literture & the remarkable
          literary works in Hindi literature.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the writing style of Kabir & also learn valuable messages.
CO2: Illustrate the precious poems of Surdas & SriKrishna Leela.
CO3: Utilize the opportunity to learn the poems of Ram bhakthi poet Thulssi das.
CO4: Build the confidence &ideas to tackle the problems ahead.
CO5: Understand the different periods of growth of Hindi Literature & the remarkable literary works in Hindi literature.

	HINDI - IV	L	T	P	Credits
		5	0	0	5

Unit I   - 'Adhunik kavitha(Apna sansar), Journalism

   Aim   Rashtra kavi'Maithili sharan gupta' dreams about his life in a beautiful manner
                  &describes how his world should be.
                  Journalism plays a great role in the development of a country .Through this,
                  students   get an opportunity to know about Hindi journalism & the developments
                  took place gradually

Unit II   - 'Adhunik kavitha(Chintha), Journalism

   Aim   Taken from 'Jayashankar prasad' 's Kamayani ,this poem explains the condition
                  of human beings at different situations.

Unit III   - 'Adhunik kavitha('Thum logom se duur'), Journalism

   Aim   'Shri Gajanan madhav mukthi bodh' describes the present day's thought of a
                  common man & expectations

Unit IV   - 'Adhunik kavitha('Sneh shapath'), Journalism

   Aim   -   Poet 'Bhavani Prasad mishra 'points out the importance of love & affection
                  and also the bad effects of enmity.

Unit V   - 'Adhunik kavitha('Nimna Madhya varg'& Bharath ki aarthi''), Journalism

   Aim   'Prabhakar machve' explains the condition of the middle class in 'Nimna Madhya varg
                  'Shamsher bahadur singh' 's poem 'Bharat ki aarthi' points out the importance of
                  patriotism & our desires.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Develop an opportunity to know about Hindi journalism & the developments took place
       gradually.
CO2:   Explain the condition of human beings at different situations.
CO3:   Describe the present day's thought of a common man & expectations.
CO4:   Analyze the importance of love & affection and also the bad effects of enmity.
CO5:   Illustrate the importance of patriotism & our desires.

	ENGLISH - I	L	T	P	Credits
		5	0	0	5

Course Objective:
- To enable students to develop their communication skills effectively. To make students familiar with the English Language.
- To enrich their vocabulary in English
- To develop communicative competency   **Credit Hours**

UNIT I - Preparatory Lesson   **12**
1. Competition Matters
   Suzanne Sievert
2. A Personal Crisis May Change History
   Dr. A.P.J. Abdul Kalam
3. Why Preserve Biodiversity
   Prof. D. Balasubramanian

UNIT II –Prose   **12**
1. The Unexpected
   Robert Lynd
2. My Greatest Olympic Prize
   Jesse Owens
3. If You are wrong, admit it
   Dale Carnegie

UNIT III –Poetry   **12**
1. The Night of the Scorpion
   Nissim Ezekiel
2. Pulley or The Gift of God
   George Herbert
3. La Bella Dame Sans Merci
   John Keats

UNIT IV- Short Story   **12**
1. The Gift of Magi
   O Henry
2. Three Questions
   Leo Tolstoy

UNIT V – One Act Play   **12**
1. The Shirt
   Francis Dilion
2. The Pie and the Tart
   Hugh Chesterman   **Total: 60 Hours**

COURSE OUTCOME
At the end of this course the students will be able to,
CO1:   Examine the difference between poetic language and the language of the prose.
CO2:   Utilize instructions on fundamentals of grammar.
CO3:   Develop their own style of writing after studying diverse prose essays.
CO4:   Classify different poems on the basis of their types.
CO5:   Conclude the textual content of both prose and poetry.
Books Prescribed:
- Confluence - Anu Chithra Publications

	ENGLISH - II	L	T	P	Credits
		5	0	0	5

Course Objective:
- To enable students to develop their communication skills effectively
- To make students familiar with various sentence patterns of the English Language
- To enrich their vocabulary in English
- To develop communicative competency

Credit Hours

UNIT-I Prose   **12**
1. The Words of Wisdom
   Chetan Bhagat
2. Forgetting Robert Lynd
3. My Early Days Dr. A.P.J.
   Abdul Kalam

UNIT II –Poetry   **12**
1. Ozymandias
   Percy Bysshe Shelley
2. Mending Wall
   Robert Frost
3. Where the Mind is Without Fear
   Rabindranath Tagore

UNIT III –Short Story   **12**
1. Am I Blue?
   Alice Walker
2. The Last Leaf   O' Henry
3. The Selfish Giant
   Oscar Wilde

UNIT IV – One Act Play   **12**
1. Soul Gone Home
   Langston Hughes

UNIT V   **12**
1. Lexical Skills
2. Vocabulary
3. Communication and Grammar at the end of all lessons

Total: 60 Hours

COURSE OUTCOME
At the end of this course the students will be able to,
CO1: Construct sentences owing to advanced grammar skills taught.
CO2: Prove better communicative ability because of illustrations from fundamental grammar.
CO3: Prove their skill in writing sentences after the modals of American, British and Indian English writers.
CO4: Develop different sensibilities in approaching life.
CO5: Solve life's problems as highlighted in the selections.
Books Prescribed:
Radiance - Emerald Publications

	ENGLISH - III	L	T	P	Credits
		5	0	0	5

Course Objective: To train students in the use of English language in varied literary and non-literary context - To teach them soft skills and strengthen their foundation in grammar and composition - To evaluate their comprehension skills.

Credit Hours

UNIT - I- Prose   **12**

    1. Two Gentleman of Verona   -   A.J. Cronin

    2. Judas Iscariot   -   Bonnie Chamberlain

    3. Dangers of Drug Abuse   -   J. V. S. Henbane

UNIT II - Short Stories   **12**

    1. Journey by Night   -   Norah Burke

    2. The 2000-Mile Turtle   -   Henry Edward Fox

    3. Fools Paradise   -   Isaac Bashevis Singer

UNIT III – Fiction   **12**

    1. R. L. Stevenson   -   Dr. Jekyll & Mr. Hyde (Retold by Kennet) – S. Chand & company Ltd.

UNIT IV - Functional English   **12**

    1. Paragraph Writing
    2. Comprehension
    3. Letter Writing
    4. Report writing
        a News Paper Report
        b Reports for Government Official Attention
        c Definition

UNIT V – Conversation In Situations & Conversation Practice   **12**

    1. Conversation in Situations
      At the Airport
      a) In a Bank
      b) On the Beach
      c) At the Customs
      d) At the Doctors'
      e) In a Flight
      f) In a Hotel
      g) In a Restaurant
      h) In a Shop
      i) Tea Time
      j) On the Telephone
      k) In a Travel Agency
      l) On a Country Walk
      m) At the theatre
      n) In a Street

2. **Conversation Practice**

   a) Daily Activities
   b) Asking Directions
   c) Travel plans
   d) Living in an Apartment
   e) Money Problems
   f) Weather Conditions
   g) Dinner Conversations
   h) Common Health Problems
   i) Tag Questions
   j) Office Conversations

3. **Expansion of Hints**

Total: 60 Hours

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:   Estimate the essays in the light of appeal of values based essays.
CO2:   Prioritize pragmatic day to day communication through letter and comprehension.
CO3:   Develop narrative skill after reading the short stories.
CO4:   Improve their own style of writing after an expose to the prescribed prose pieces.
CO5:   Adapt themselves to life context wherein soft skill learning is a must.

Books Prescribed:

1. Effective English Communications for You – V. Syamala, Emerald Publishers, Chennai.
2. English Conversation Practice by D. H. Spencer, Oxford University Press
3. English Conversation Practice by Grant Taylor, Tata McCraw-Hill, Publishing Company Limited, New Delhi.

		L	T	P	Credits
ENGLISH - IV		5	0	0	5

Course Objective: To train students in the use of English language in varied literary and non-literary context - To teach them soft skills and strength their foundation in grammar and composition -To elevate their comprehension skills.

Credit Hours

UNIT I – Prose　　　　　　　　　　　　　　　　　　　　　　　　　　**12**

   1. Walking Tours　　　　　　-　　　　R. L. Stevenson

   2. All About a Dog　　　　　　-　　　　A. G. Gardinar

   3. No Man is an Island　　　　-　　　　Minno Masani

UNIT II - Short Stories　　　　　　　　　　　　　　　　　　　　　**12**
   1.　The Man Who Likes Dickens -　Evelyn Waugh
   2.　Lamb to the Slaughter　-　　　Roald Dahl
   3.　Buck Hears the Call　　-　　　Jack London

UNIT III – Drama　　　　　　　　　　　　　　　　　　　　　　　**12**
   1. Selected Scenes from Shakespeare's Plays – Book I, Emerald Publishers
      a)　Funeral Oration (Julius Caesar)
      b)　Trial for a Pound of Flesh (The Merchant of Venice)
      c)　Patterns of Love (As You Like It)

UNIT IV　　　　　　　　　　　　　　　　　　　　　　　　　　　**12**
   1.　General Essay Writing & Group Discussion
   2.　Persuasive Writing and Role Play

UNIT V　　　　　　　　　　　　　　　　　　　　　　　　　　　**12**
   1. Notice, Agenda, Minutes.

Total: 60 Hours

COURSE OUTCOME

At the end of this course the students will be able to,

CO1:　Develop hints into ideas.
CO2:　Create different kinds of business letters.
CO3:　Take part in exercises of analytical ability.
CO4:　Develop humanistic perspectives.
CO5:　Prove their skills in dialogue and abstract writing.

Books Prescribed:
1. Invitation to English Prose – A. E. Varadarajan & S. Jagadisan, Orient Black Swan, Chennai