

ST. MARY'S COLLEGE (AUTONOMOUS), THOOTHUKUDI
Bachelor of Science (Physics)
Course structure (w. e. f. 2015)

Semester – I

<i>Part</i>	<i>Subject</i>	<i>Subject code</i>	<i>Title of the paper</i>	<i>Contact Hours/Week</i>	<i>Credits</i>	<i>Max. marks</i>		
						<i>CIA</i>	<i>ESE</i>	<i>Total</i>
I	Tamil/	15ULTA11	Cheyyul, Elakkanam, Urainadai, Sirukathai, Elakkia Varalaru. Paper – I French Language and Culture	6	3	50	50	100
	French	15ULFR11						
II	English	15ULEA11 15ULEB11 15ULEC11	General English	6	3	50	50	100
III	Core - I	15UPHC11	Mechanics and Properties of matter	4T +1P	4	50	50	100
	Core- II	15UPHC12	Thermal Physics	4T +1P	4	50	50	100
	Allied I	15UCHA11	Alliedchemistry	4T +2P	4	50	50	100
IV	Foundation Course	15UFPD11	Personality Development	2	2	50	50	100
				30	20	300	300	600

Semester II

<i>Part</i>	<i>Subject</i>	<i>Subject code</i>	<i>Title of the paper</i>	<i>Contact Hours/Week</i>	<i>Credits</i>	<i>Max. marks</i>		
						<i>CIA</i>	<i>ESE</i>	<i>Total</i>
I	Tamil/	15ULTA21	Cheyyul, Elakkanam, Urainadai, Valkkai Varalaru, Elakkia Varalaru. Paper – I I French Language and Culture	6	3	50	50	100
	French	15ULFR21						
II	English	15UGEA21 15UGEB21 15UGEC21	General English	6	3	50	50	100
III	Core – III	15UPHC21	Optics	4T +1P	4	50	50	100
	Core – IV	15UPHC22	Electricity and Electromagnetism	4T +1P	4	50	50	100
	Allied I	15UCHA21	Alliedchemistry	4T +2P	4	50	50	100
IV	Practical I	15UPHPR1	Practical I		2	50	50	100
	Allied Practical	15UCHAR1						
	Foundation Course	15UFVE21	Value Education	2	2	50	50	100
	NCC/NSS/ Sports				1			
				30	25	400	400	800

Semester III

Part	Subject	Subject code	Title of the paper	Contact Hours/Week	Credits	Max. marks		
						CIA	ESE	Total
I	Tamil/ French	15ULTA31	Cheyyul, Elakkanam, Puthinam, Elakkia Varalaru. Paper – III - French Language and Civilization	6	3	50	50	100
		15ULFR31						
II	English	15UGEA31 15UGEB31 15UGEC31	General English	6	3	50	50	100
III	Core – V	15UPHC31	Electronics and Communication	4T + 2P	4	50	50	100
	Allied I	15UMAA31	Allied Mathematics I	6	5	50	50	100
	SBE	15UPHS31	Office Automation (Practicals)	2	2	50	50	100
	NME	15UPHN31	Electronics	2	2	50	50	100
IV	Foundation Course	15UFES31	Environmental Sciences	2	2	50	50	100
	Self Study Course I (Optional)	15UPHSS1	Soft Skills		1			100
				30	22	350	350	800

Semester IV

Part	Subject	Subject code	Title of the paper	Contact Hours/Week	Credits	Max. marks		
						CIA	ESE	Total
I	Tamil/ French	15ULTA41	Cheyyul, Elakkanam, Urainadai, Naadagam,, Elakkia Varalaru. Paper – IV – Initiation to French Literature	6	3	50	50	100
		15ULFR41						
II	English	15UGEA41 15UGEB41 15UGEC41	General English	6	3	50	50	100
III	Core – VI	15UPHC41	Programming in C++	4T + 2P	4	50	50	100
	Allied II	15UMAA41	Allied Mathematics II	6	5	50	50	100
	SBE	15UPHS41	Bio- Medical Instrumentation	2	2	50	50	100
	NME	15UPHN41	Applied Physics	2	2	50	50	100
	Foundation course	15UFYM41	Yoga Management	2	2	50	50	100
	Self Study Course II (Optional)	15UPHSS2	Modern Photography		1			100
	Practical II	15UPHPR2	Practical II		2	50	50	100
				30	24	400	400	900

Semester V

<i>Part</i>	<i>Subject</i>	<i>Subject code</i>	<i>Title of the paper</i>	<i>Contact Hours/Week</i>	<i>Credits</i>	<i>Max. marks</i>		
						<i>CIA</i>	<i>ESE</i>	<i>Total</i>
III	Core VII	15UPHC51	Digital Electronics	5T + 3P	5	50	50	100
	Core VIII	15UPHC52	Solid State Physics	4T + 3P	4	50	50	100
	Core Elective I	15UPHE51	Renewable Energy Sources	4T + 2P	4	50	50	100
	Core Elective II	15UPHE52	Opto Electronics and Fibre Optics Communication	5	4	50	50	100
	SBE	15UPHS51	Physics for Competitive Examinations	4	3	50	50	100
	Self Study Course III (Compulsory)	15UPHSS3	Bio Physics		1			100
				30	21	250	250	600

Semester VI

<i>Part</i>	<i>Subject</i>	<i>Subject code</i>	<i>Title of the paper</i>	<i>Contact Hours/Week</i>	<i>Credits</i>	<i>Max. marks</i>		
						<i>CIA</i>	<i>ESE</i>	<i>Total</i>
III	Core IX	15UPHC61	Modern Physics	6T + 3P	5	50	50	100
	Core X	15UPHC62	Nuclear and Particle Physics	6T + 3P	5	50	50	100
	Core XI/Project	15UPHC63	Project	5	5	50	50	100
	Core Elective III	15UPHE61	Advanced Physics	5 + 2P	4	50	50	100
	Practical III	15UPHPR3	Practical III		12			100
	Practical IV	15UPHPR4	Practical IV					100
	Practical V	15UPHPR5	Practical V					100
				30	31	200	200	700

**Bachelor of
Science (Physics)**

Components	Credit per semester	No. of Courses	Total
Tamil	3	4	12
English	3	4	12
Core	4	7	28
Core	5	4	20
Allied	5	2	10
Allied	5	2	10
Core Elective	4	3	12
SBE	2	2	4
SBE	3	1	3
NME	2	2	4
Practical(I & II Yr.)	1	4	4
Practical(III Yr.)	4	3	12
Foundation Course	2	4	8
Compulsory Self Study Course	1	1	1
NCC/NSS/Sports	1	1	1
Extension Activities	1	1	1
(Optional)Self Study Course			2
			144

SEMESTER- I			
CORE – I – MECHANICS & PROPERTIES OF MATTER			
Code : 15UPHC11	Hours/Week: 4	Hrs/ Semester: 60	Credits : 4

Objectives:

- To make the learners to understand the conservation laws and oscillations
- To learn the basics of properties of matter.

Unit I: Conservation laws

Principle of conservation of energy – Work energy theorem – Conservative force – Conservation of linear momentum, angular momentum and energy – Centre of mass of a system of particles – Two body problem and reduced mass – Moment of Inertia of system of diatomic molecules.

Unit II: Collision and Projectiles

Collision – Impulse and linear momentum – Elastic and inelastic collision – Fundamental principles of impact – Direct and indirect impact – Velocities and kinetic energy in direct impact – Loss of K. E in indirect impact – Transfer of energy in collision between two equal masses – Projectile – Range on a horizontal plane and inclined plane.

Unit III: Gravitation

Gravitation – Newton’s law of gravitation – Determination of gravitational constant – Boy’s method – Gravitational potential and field due to a spherical shell and solid sphere – Acceleration due to gravity – g – compound pendulum – Variation of g with altitude and latitude.

Unit IV: Elasticity and bending of beams

Stress – Strain – Hooke’s law – Poisson’s ratio – Twisting couple on a cylindrical wire (Torsion) – Expression for couple per unit twist – Work done in Twisting – Torsion pendulum – Theory – Determination of rigidity modulus – Dynamic method. Bending of beams – Expression for bending moment – Uniform and non-uniform bending – Theory and experiment – Determination of Young’s Modulus – Work done in bending – Cantilever – Expression for depression at the loaded end of a cantilever.

Unit V: Viscosity and Surface Tension

Streamlined motion – Turbulent motion – Coefficient of viscosity – Rate of flow of liquid in a capillary tube by dimension method and Poiseuille’s formula – Analogy between liquid flow and current flow – Experimental determination of viscosity of a liquid by Stoke’s method.

Surface tension – Work done in increasing area of the surface – Work done in blowing a bubble – Variation of surface tension with temperature – Experimental determination of surface tension (Jaeger's method) – Excess of pressure inside a curved liquid surface – Excess pressure inside a liquid drop – Excess pressure inside a soap bubble.

Text Books:

1. A. Ubald Raj & Jose Robin, Mechanics and relativity, Indira publication(2008).
2. R. Murugesan, Properties of matter, S. Chand & Company Ltd, Revised edition 2008.
3. Brijlal & N. Subramanyam, Mechanics and Electrodynamics, S. Chand & Co. Ltd. (2005).

Books for Reference:

1. D. S. Mathur, Mechanics, S Chand & Co. Ltd.(1984).
2. D. S. Mathur, Properties of matter, Shyam Lal Charitable trust, Ram Nagar, 1992.
3. David Halliday, Robert Resnick & Jearl Walker, Fundamentals of Physics, John Wiley & Sons Pvt. Ltd., Reprint 2014.

SEMESTER-I			
CORE – II– THERMAL PHYSICS			
Code : 15UPHC12	Hours/Week: 4	Hrs/ Semester: 60	Credits : 4

Objectives:

- To study the transport phenomena
- To acquire knowledge about the laws of thermodynamics
- To derive the expression for efficiency of heat engine
- To study Maxwell's thermodynamic relations
- To study different methods of liquefaction

Unit I: Transport phenomenon

Evidences in favour of molecular motion – Mean free path – Dulong and Petit's law Clausius and Maxwell expression – Expression for Avogadro number – Degrees of freedom and the ratio of specific heat capacities – Transport phenomenon – Viscosity of gases – Thermal conductivity of gases – Diffusion of gases.

Unit II: Laws of thermodynamics

Thermodynamics – Some basic concepts – Thermodynamic equilibrium – Work depends on the path – First law of thermodynamics – Significance of the 1st law – Isothermal and adiabatic changes – Application of the I law – Relations in adiabatic changes of perfect gases – Adiabatic lapse rate – II law of thermodynamics – III law of thermodynamics – Clausius statement – Kelvin - Planck's statement.

Unit III: Heat engines

Concept of entropy – Entropy change in reversible process – Carnot's cycle – T-S diagram to find its efficiency – Entropy change of an ideal gas (perfect gas) – Entropy change when ice melts – Change of entropy when water is converted into steam .

Unit IV: Maxwell's thermodynamic relations

Maxwell's thermodynamic relations – Applications of Maxwell's relations – Clapeyron's equation – Change of internal energy with volume – Thermodynamic relations with heat capacities – Cooling by adiabatic expansion and its converse – Heating by adiabatic compression – Clausius equation (second latent heat equation).

Unit V: Transfer of heat and low temperature

Conduction of heat – Lee's Disc's method of determining K of a bad conductor – convection of heat – Newton's law of cooling by convection – Experimental verification of Newton's law of cooling – The Joule Porous plug experiment – Relation between inversion, Boyle and critical temperatures – Adiabatic demagnetization – Theory and experimental setup.

Text Books:

1. A. Ubald Raj and G. Jose Robin, Thermal physics, Indira publication,2008.
2. Brijlal and N. Subramanyam, Heat and thermodynamics, S. Chand & Co. Ltd.,2005.

Books for Reference:

1. B. Gupta, H.P. Roy, Thermal Physics, Books and Allied (P) Ltd., Second edition(2005).
2. Halliday and Resnick, Fundamentals of Physics, John Wiley Publication, 6thedition, Reprint, 2014.
3. Arunabhasen, A. B. Gupta, College Physics, volume I, Books and Allied (P) Ltd, (2005).

SEMESTER I			
ALLIED PHYSICS – PAPER I - I B.Sc., Mathematics			
Code : 15UPHA11	Hrs/Week: 4	Hrs/ Semester: 60	Credits : 4

Objectives:

- To study about elasticity and bending moment
- To know about surface tension and viscosity and to study Bernoulli's theorem
- To study mean free path and transport phenomena
- To determine thermal conductivity of the bad conductor and specific heat capacity of liquid
- To have a knowledge about physical optics

Unit I: Elasticity

Elastic moduli – Work done in shearing strain – Relation between elastic constants – Twisting couple on a cylindrical wire – Expression for couple per unit twist – Torsion pendulum – Experiment to determine the rigidity modulus of a wire using Torsion pendulum.

Unit II: Bending moment

Bending of beams – Expression for bending moment – Theory of uniform bending – Expression for elevation in uniform bending – Experiment to find young's modulus using microscope – Non-uniform bending – Expression for depression – Experiment to find young's modulus using scale and telescope.

Unit III: Surface tension & Viscosity

Surface tension – Excess of pressure over a curved surface – Coefficient of viscosity and its dimension – Experiment to determine the coefficient of viscosity of a highly viscous liquid (Stoke's) – Rate of flow of liquid through a capillary tube by dimension method and by Poiseuille's method – Analogy between current flow and liquid flow.

Unit IV: Thermal Physics

Mean free path – expression for mean free path – Transport phenomena – Expression for viscosity, thermal conductivity and diffusion – Thermal conductivity – Lee's disc experiment to determine the thermal conductivity of a bad conductor – Newton's law of cooling – Determination of specific heat capacity of a liquid.

Unit V: Interference and diffraction

Young's double slit experiment – Condition for interference – Additional phase difference due to dissimilar reflections – Colour of thin film – Air wedge – Thickness of a wire – Fresnel and Fraunhofer diffraction – Plane transmission grating – Experiment to find wavelength by normal incidence method – Distinction between interference and diffraction bands.

Text Book:

A. Ubald Raj & G. Jose Robin, Allied Physics, Indra Publications(2012).

Books for Reference:

1. D. S. Mathur, Properties of matter, Shyamalal charitable trust, Ram Nagar,1992.
2. R. Murugesan, Properties of matter, S. Chand & Co. Ltd.,2008.
3. David Halliday, Robert Resnick&Jearl Walker, Fundamentals of Physics, John Wiley& SonsInc.
4. Brijlal& Subramanian, A text book of Optics, S. Chand &Co.

SEMESTER- I			
Foundation Course: Personality Development			
Code: 15UFPD11	Hrs/Week: 2	Hrs/ Semester: 30	Credits : 2

Objectives

- To set a vision for realizing humanness and its inner strength
- To understand and accept one's own personality and to grow in self-formation

Unit I: Personality

The Self – Adolescent: Need of the Adolescent – Obstacles to Adolescent – Understanding one self – Psychology of human life. What makes me? Goal in Life – Meaning of Life – Ambition – Individuality, Personality Development : Healthy personality – Knowing oneself – Self-acceptance – Self-image

Unit II: Interpersonal Relationships

Characteristic and Elements of personality patterns – Dynamics of Inter-personal relationships – analysis of relations of different ego states – analysis of strokes and life positions – Socialization – Friendship – Infatuation – Peer groups – Harmful – Friendship.

Unit III: Motivation

Introduction – relevance and types of motivation – motivating others

Unit IV: Stress Management

Introduction – causes and impacts of stress – managing stress – conflict management – introduction – causes and management

Unit V: Time Management

Time as a resource – identify important time management wasters – individual time management styles – techniques for better time management

Books for Reference :

1. Marie Mignon Mascarenhas, Family Life Education Value Education, All India Association for Higher Education CREST, Bangalore, 1983.
2. AIACHE – human values development programme, New Delhi
3. D. John Antony Self Psychology Counselling, Anugraha Publications
4. Lall and Sharma, Personal Growth Training and Development, Excel Books.
5. Janakiraman, Training and Development, Biztantra
6. Hurlock and Elizabeth B, Personality Development, Tata McGraw Hill, 1st Ed.
7. Sahu R.K, Training for Development, Excel Books, 1st Ed.

SEMESTER- II			
CORE – III – OPTICS			
Code : 15UPHC21	Hrs/Week: 4	Hrs/ Semester: 60	Credits : 4

Objectives:

- To determine refractive index and dispersive power with prism
- To understand the principles of interference with different applications
- To find wavelengths using grating & to know about the resolving power of microscope
- To prove that light consists of transverse vibrations

Unit I: Refraction in lenses

Introduction – Refractive index and optical path – Fermat's principle – Deduction of laws of reflection and refraction – Refraction through lenses (lens maker's formula) – Deviation produced by thin lens – Equivalent focal length of two thin lenses separated by a distance when the object is kept at infinity – Cardinal points (definition).

Unit II: Dispersion and Aberrations

Dispersion through a prism – Angular dispersion – Dispersive power – Deviation without dispersion – Dispersion without deviation – Constant deviation spectroscopy – Spherical aberration in lenses – Methods of minimizing spherical aberration – Aplanatic points in lenses separated by distance – Chromatic aberration in lenses – Condition for achromatism of two thin lenses in contact and out of contact – Achromatic lenses.

Unit III: Interference

Interference – Conditions for interference – Interference due to reflected systems – Colours of thin films – Air wedge – Determination of diameter of a thin wire by air wedge – Test for optical flatness – Michelson's interferometer – Determination of λ .

Unit IV: Diffraction

Fresnel's diffraction – Half period zones – Zone plate – Fraunhofer diffraction – Plane diffraction grating – Theory and experiment to determine wavelength – Normal incidence – Oblique incidence – Rayleigh's criterion for resolution – Dispersive power of grating – Resolving power of grating.

Unit V: Polarisation

Double refraction – Nicol prism – Polarizer and Analyzer – Quarter wave plate and Half wave plate – Plane, elliptically and circularly polarized light – Production and detection – Optical activity – Fresnel's theory of optical activity – Specific rotatory power – Laurent's half shade polarimeter.

Text Books:

1. N. Subramanyam and Brijlal, Optics, S. Chand & Co. Revised by M. N Avadhanulu, 23rd revised edition (2006).
2. R. Murughesan, Optics and Spectroscopy, S. Chand & Co.(1995).

Books for Reference:

1. D. S. Pandey, Optics and Modern Physics, ArihantPrakashan (2008).
2. David Halliday, Robert Resnick&Jearl Walker, Fundamentals of Physics, John Wiley & Sons Inc., Reprint2014

SEMESTER- II			
CORE – IV – ELECTRICITY & ELECTROMAGNETISM			
Code : 15UPHC22	Hours/Week: 4	Hrs/ Semester: 60	Credits : 4

Objectives:

- To deal with the basic concept of electricity
- To discuss the laws of electromagnetic induction
- To extend Maxwell's equations for the propagation of electromagnetic waves

Unit I: Steady currents and Thermo electricity

Current and current density – equation of continuity – Ohm's law – Kirchoff's laws – Applications to Wheatstone's network – Carey Foster bridge – Determination of coefficient of resistance – Potentiometer – Seebeck effect – law of successive temperature – law of intermediate metals – thermocouple – laws of thermo emf – Peltier effect – Thomson effect – thermodynamics of thermocouple – measurement of thermo emf using a potentiometer.

Unit II: Magnetic properties and Magnetic effect of electric current

Magnetic induction (B) – Magnetization (M) – Relation between B, H and M – magnetic susceptibility – magnetic permeability – relation connecting them.

Moving coil B.G – construction and theory – correction for damping in B.G. – measurement of charge sensitiveness – absolute capacity of a condenser – Desauty's bridge to compare two capacitances.

Unit III: Electromagnetic Induction

Faraday's laws of induction – Lenz law – expression for induced current – self induction – self inductance of a long solenoid and a toroidal solenoid – Determination of self inductance by Rayleigh's method using B.G – Mutual induction – determination of mutual inductance – Eddy currents.

Unit IV: AC circuits

Alternating currents – average and r.m.s value – a.c through L and R in series – a.c through C and R in series – a.c through L and R in parallel – Vector diagram method – LCR series resonance circuit – sharpness of resonance – Q factor – parallel resonance circuit – Q – factor – power in a.c circuits – power factor – wattless current – choke – transformer – a.c and d.c motors.

Unit V: Maxwell's equations and Electromagnetic waves

Fundamental laws of electromagnetism – ampere's law – need for modifying ampere's law – Maxwell's modification of Ampere's law – displacement current – Maxwell's equations – energy in electromagnetic waves – Poynting vector.

Text Books:

1. Brijlal and Subramaniam, Electricity and Magnetism, 7th edition, Ratan Prakash mandir (1994)
2. R. Murugesan, Electricity and Magnetism, 2nd revised edition, S. Chand & company Ltd. (1998)

Books for Reference:

1. R. Murugesan, Electricity and Magnetism, 5th revised edition, Sultan Chand & Sons, New Delhi (1992)
2. D.C. Tayal, Electricity and Magnetism, 3rd revised edition – Himalaya Publishing House (1998)
3. David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, 6th edition, Wiley & Sons Inc. edition (2006)

SEMESTER II			
ALLIED PHYSICS – PAPER II - I B.Sc., Mathematics			
Code : 15UPHA21	Hrs/Week: 4	Hrs/ Semester: 60	Credits : 4

Objectives:

- To study about Coulomb's law & Gauss law and its applications
- To determine self inductance using Ballistic Galvanometer
- To derive Schrodinger's equation and to know uncertainty principle
- To understand logic gates as universal buildingblocks
- To study about solar energy and itsapplications

Unit I: Electrostatics

Coulomb's law – Electric field and field intensity – Electric field due to point charge – Electric dipole – Electric flux – Gauss law – Applications – Electric field due to a charged conducting sphere (point inside and point outside) – Uniformly charged cylinder (line charge) – Electric potential – Potential difference – Relation connecting electric field and electric potential at a point – Equipotential surface.

Unit II: Electromagnetism

Faraday's laws of induction – Induced current and charge – Self induction – Self inductance of torroidal solenoid – Determination of self inductance using Rayleigh method – Mutual inductance – Coefficient of coupling – Determination of mutual inductance using B.G.

Unit III: Relativity and Wave mechanics

Frame of reference – Galilean transformation – Postulates – Lorentz transformation –De Broglie's theory of matter waves – De Broglie wavelength – Wave function –Postulates of quantum mechanics – Schrodinger wave equation – Time dependent form.

Unit IV: Digital electronics

Binary numbers – Conversion of decimal number into binary number – Binary to decimal – Binary addition – Multiplication –Subtraction by 2's complement – Basic logic gates - OR , AND, NOT, NOR, NAND gates – De Morgan's laws – Boolean equations and logic circuit from truth table – NOR and NAND gates as universal building blocks –Binary adder – Half adder.

Unit V: Energy Physics

World's reserve of commercial energy source and their availability – Various forms of energy – Conventional and non conventional energy sources – Solar energy – Photo voltaic effect – Photo voltaic cells – Conversion of solar energy into electricity – Solar cells – Solar heaters – Wind energy – Power of wind – Wind mill – Wind farms – Energy crisis and possible solutions – Global warming.

Text Books:

1. A. Ubald Raj & G. Jose Robin, Allied Physics, Indra Publications 2012.
2. R. Murugesan, Modern Physics, S. Chand & Co. 2011.

Book for Reference:

1. G. D. Rai, Solar energy Utilization, Khanna Publishers, V edition, 7th reprint 2008.
2. Brijlal N. Subramanian, Electricity & Magnetism, Ratan Prakashan Mandir, 14th revised edition, (1985).
3. K.K. Tewari, Electricity and magnetism – Published by Sultan Chand & Co, Reprint-2nd edition 1994.
4. Milman and Taub, Integrated Electronics – International student edition, (TMH)

SEMESTER- II			
Foundation Course: Value Education			
Code: 15UFVE21	Hours/Week: 2	Hrs/ Semester: 30	Credits : 2

Objectives:

- To help students to imbibe the best cherished behaviour pattern as individuals, citizens and members of the community
- To develop high ethic standards and moral values

Unit I:

Me – Myself – College – Life and Values – on protests and demonstration – on beliefs – ethical matters – Values – internalization of values – transformation of self.

Unit II:

Life Enrichment skills; Purpose for life – sensitization towards gender equality, physically challenged, intellectually challenged. Respect to age, experience, maturity, family members, neighbours, Co-workers.

Unit III:

Forgiveness, Integrity, Humility, Truthfulness, Sacrifice, Sincerity, Self Control, Altruism, Scientific vision.

Unit IV:

Constitutional or national values – democracy, socialism, secularism, equality, justice, liberty, freedom, fraternity. Social values, self control universal brotherhood. Religions - Path to God, Religions – Expressions of God Experience – Religious Tolerance. Art: The Meaning of the term–Nature and Function of Art–Art Appreciation–Art for a fuller living - Modern Art – Art and Morality.

Unit V:

Control of mind through

- a. Simplified physical exercise
- b. Meditation – objectives, types, effect on body, mind & soul
- c. Activities
 - (i) Moralization of desires

(ii) Neutralization of anger

(iii) Eradication of worries

(iv) Benefits of blessing

Books for Reference:

1. AIACHE – human Values development Programme, New Delhi
2. Thomas Anchukandam, Grow Free Live Free, KristuJyoti Publications, Salesians, Bangalore, 1998
3. D. John Antony Self Psychology Counselling, Anugraha Publications
4. Prof. N.S. Raghunathan, Value Education, Margham publications, Chennai 2015.
5. Marie Mignon Mascarenhas, Family Life Education, Value Education, All India Association for Higher Education CREST, Bangalore, 1983

SEMESTER- II			
PRACTICAL I			
Code: 15UPHPR1	Hours/Week: 2	Hrs/ Semester: 30	Credits : 4

Any 14 experiments

1. Young's modulus - Uniform bending (pin and microscope)
2. Young's modulus - Non uniform bending (scale and telescope)
3. Young's modulus - Cantilever depression (pin and microscope)
4. Rigidity modulus – Torsion pendulum
5. Coefficient of viscosity – Stoke's method
6. Compound pendulum - 'g' and 'k'
7. Sonometer - A.C frequency
8. Specific heat capacity of liquid – Newton's law of cooling
9. Thermal conductivity of a bad conductor - Lee's disc
10. Surface Tension – Capillary rise
11. Spectrometer – D & μ
12. Prism - Dispersive power
13. Equivalent focal length of two lenses (i) in contact and (ii) out of contact
14. Specific latent heat of fusion of ice
15. Melde's String
16. Surface Tension- Drop weight method
17. Coefficient of viscosity- Burette method

SEMESTER II			
ALLIED PHYSICS PRACTICALS - I B.Sc., Mathematics			
Code : 15UPHAR1	Hrs/Week: 2	Hrs/ Semester: 30	Credits : 2

(Any 12 experiments)

1. Young's modulus – Uniform bending – Pin and microscope
2. Young's modulus – Non-uniform bending – Scale and telescope
3. Rigidity modulus – Torsion pendulum
4. Specific heat capacity of liquid – Newton's law of cooling
5. A. C. frequency – Sonometer
6. Spectrometer – Dispersive power of the prism
7. Spectrometer – Grating – Oblique incidence
8. Air wedge – Thickness of a wire
9. Potentiometer – Calibration of voltmeter by standardization method
10. Potentiometer – Calibration of Ammeter
11. Characteristics of Zener diode
12. Basic logic gates – OR, AND and NOT
13. Series resonance circuits
14. Parallel resonance circuits
15. Co-efficient of viscosity – Stoke's method
16. Surface tension – Capillary rise method.
17. Compound pendulum - g

SEMESTER- III			
CORE – V– ELECTRONICS AND COMMUNICATION			
Code: 15UPHC31	Hours/Week: 4	Hrs/ Semester: 60	Credits : 4

Objectives :

- To study the basic theorems
- To study the working of diodes and transistors
- To analyse different types of amplifiers
- To know about the concepts of feedback and its applications in an amplifier and an oscillator
- To study the uses of various instruments applied for measurements

Unit I: Linear Circuit Analysis

Linear and non-linear circuit elements – Active and Passive elements – Ideal voltage source and current source – Superposition theorem – Thevenin's theorem – Norton's theorem – Maximum power transfer theorem – h -parameters.

Unit II: Semiconductor Devices

Diodes: Semiconductors – P and N type semiconductors – PN junction diode under forward bias, reverse bias – Silicon and Germanium diodes – Energy band diagram of PN diode – V-I characteristics of a PN diode – Experimental determination of knee voltage, ac forward resistance and reverse saturation current of a PN diode – Diode rectifier – Half wave rectifier – Expression for I_{dc} , I_{rms} , efficiency and ripple factor – Bridge rectifier – Zener diode – V-I characteristics – Voltage regulator.

Transistor: Junction transistor – Three modes of transistor connection – Relation between alpha and beta of transistor – Transistor parameter calculation for CE mode – Single stage transistor amplifier.

Unit III: Oscillators

Feedback – Negative voltage feedback amplifier – Principle – Gain – Advantages – Feedback circuit. Negative current feedback – Principle – Current gain – Effects – Emitter follower – D.C. analysis – Voltage gain – input impedance – Output impedance – Applications – Sinusoidal oscillator – Types – Oscillatory circuit. Positive feedback amplifier – Barkhausen criterion. Colpitt's oscillator, Hartley oscillator.

Unit IV: Operational Amplifier

Operational amplifier basic ideas – inverting amplifier – summing amplifier – differential amplifier – integrator & differentiator using Op amp – Instrumentation amplifier using Op amp – Differential Instrumentation amplifier using transducer bridge – application to measurement of temperature and as analog weight scale – Multivibrator (Astable, Monostable and Bistable using Op amp).

Unit V: Modulation and Demodulation

Radio Amplitude modulation – Modulated power output – Single side band transmission: A.M – Frequency Modulation – FM transmitter – Demodulation – Transmission of radio waves – Reception of radio waves – Superhetrodyne Receiver – Characteristics of areceiver.

Text Books:

1. V. K. Mehta and Rohit Mehta, Principles of Electronics, S. Chand &Co. Ltd.2006.
2. G. Jose Robin and A. Ubald Raj, Electronics (I Edition), Indira Publication, Marthandam,2000.

Books for Reference:

1. R. S. Sedha, A text book of applied electronics, S. Chand & Co. Ltd.2006
2. B. L. Theraja, Basic Electronics (solid state), S. Chand & Co. Ltd.2003.
3. N. N. Bargava, D. C. Kulshreshtha, S. C. Gupta, Basic Electronics and linear circuits, Tata McGraw Hill Publishing company Ltd, Reprint2012.

SEMESTER III			
ALLIED PHYSICS – PAPER I - II B.Sc., CHEMISTRY			
Code : 15UPHA31	Hrs/Week: 4	Hrs/ Semester: 60	Credits : 4

Objectives:

- To study about elasticity and bending moment
- To know about surface tension and viscosity and to study Bernoulli's theorem
- To study mean free path and transport phenomena
- To determine thermal conductivity of the bad conductor and specific heat capacity of liquid
- To have a knowledge about physical optics

Unit I: Elasticity

Elastic moduli – Work done in shearing strain – Relation between elastic constants – Twisting couple on a cylindrical wire – Expression for couple per unit twist – Torsion pendulum – Experiment to determine the rigidity modulus of a wire using Torsion pendulum.

Unit II: Bending moment

Bending of beams – Expression for bending moment - Theory of uniform bending – Expression for elevation in uniform bending – Experiment to find young's modulus using microscope – Non- uniform bending – Expression for depression – Experiment to find young's modulus using scale and telescope.

Unit III: Surface tension & Viscosity

Surface tension – Excess of pressure over a curved surface – Coefficient of viscosity and its dimension – Experiment to determine the coefficient of viscosity of a highly viscous liquid (Stoke's) – Rate of flow of liquid through a capillary tube by dimension method and by Poiseuille's method – Analogy between current flow and liquid flow.

Unit IV: Thermal Physics

Mean free path – expression for mean free path – Transport phenomena – Expression for viscosity, thermal conductivity and diffusion – Thermal conductivity - Lee's disc experiment to determine the thermal conductivity of a bad conductor – Newton's law of cooling – Determination of specific heat capacity of a liquid.

Unit V: Interference and diffraction

Young's double slit experiment – Condition for interference – Additional phase difference due to dissimilar reflections – Colour of thin film – Air wedge – Thickness of a wire – Fresnel and Fraunhofer diffraction – Plane transmission grating - Experiment to find wavelength by normal incidence method – Distinction between interference and diffraction bands.

Text Book:

1. A. Ubald Raj & G. Jose Robin, Allied Physics, Indra Publications (2012).

Books for Reference:

1. D. S. Mathur, Properties of matter, Shyamalal charitable trust, Ram Nagar, 1992.
2. R. Murugesan, Properties of matter, S. Chand & Co. Ltd., 2008.
3. David Halliday, Robert Resnick & Jearl Walker, Fundamentals of Physics, John Wiley & Sons Inc.
4. Brijlal & Subramanian, A text book of Optics, S. Chand & Co.

SEMESTER III			
SBE–OFFICE AUTOMATION			
Code : 15UPHS31	Hours/Week: 2	Hrs/ Semester: 30	Credits : 2

Objectives:

- To have knowledge of computer and to understand the aspects of MSword
- To help the students to know about Excel and Power Pointpresentation.

Unit I:

Word – introduction to office 2007 – creating the document – Editing the document – using proof reading tools – Fonts and font styles – Borders and colours – Adding headers and footers and page number bulletin.

Unit II:

Auto formatting – printing – creating numbered and Bulleted lists – using word tables – creating columns – Adding graphics and Mail merge.

Unit III:

Creating a New work book – Entering data – Getting around in Excel – Editing worksheets – working with ranges – Inserting and removing cells – Rows and Columns.

Unit IV:

Managing your work sheets – printing your workbook – performing simple calculations – calculation with functions – creating charts.

Unit V:

Creating a new presentation – Inserting, deleting and copying slides – Adding and Modifying slide text – Adding Graphics to a slide – working with power point objects.

Text Book:

1. Joe Habraken, MS office 2000 – 8 in1.

Books for Reference:

1. Sanjay Saxena, MS office 2000 foreveryone.
2. Stephen Nelson, Office 2000, The complete reference, TataMcgraw HillPublishing companyLtd

SEMESTER III			
Foundation Course: Environmental Studies			
Code : 15UFES31	Hours/week:2	Hrs/ Semester: 30	Credits :2

Objectives

- To make the students environmentconscious
- To sensitize the students about the environmental crisis and environmentalprotection
- To create an awareness among the students about sustainable utilizationand conservation of naturalresources

Unit I: Environment – Natural Resources

Environment – Definition, components, need for public awareness, Natural Resources – Renewable and non-renewable. Forest resources – Uses, Over exploitation, Deforestation, Water resources – Uses and conservation, rain water harvesting. Energy resources – Renewable and non-renewable. Solar, wind and Biomass energy. Role of individuals in conservation of natural resources.

Unit II: Ecosystem

Ecosystem – concepts, components – Abiotic and Biotic components (Producer, Consumer and Decomposer), Energy flow – Food chain, food web and Ecological pyramids, Structure and function of grass land (Terrestrial) and Pond (Aquatic) ecosystem.

Unit III: Environmental Pollution

Definition, causes, effects and control measures of air pollution, water pollution and soil pollution, nuclear hazards, solid waste management. Disaster management – flood, earth quake, tsunami. Role of individuals in the prevention of pollution.

Unit IV: Biodiversity and conservation

Definition and levels of Biodiversity (Genetical, Ecological and Species Diversity) values of Biodiversity. Threats and loss of Biodiversity – causes. Hot spots of Biodiversity (with special reference to India). Conservation of Biodiversity – *In situ* and *Ex situ* conservation.

Unit V: Social Issues and Environment

Sustainable development, consumerism and waste products, climate change – Global warming, Ozone layer depletion. Waste land reclamation. Population explosion – Family welfare programme, HIV / AIDS, The environment (Protection) Act – 1986. International union for conservation of nature and natural resources (IUCN), World Wild Life Fund (WWF), Man and Biosphere Programme (MAB).

Books for Reference:

1. Kaushik, A. and Kaushik, C.P.K., Perspectives in Environmental Studies – New Age, International Pvt. Ltd., New Delhi,2004.
2. Odum, E.P., Fundamentals of Ecology, Natraj Publishers, New Delhi,1996.
3. Saha, T.K. Ecology and Environmental Biology, ArunabhaSen Books & Allied Pvt. Ltd., Kolkata,2007
4. Sharma, Environmental Biology, Rastogi Publications, Meerut, 2006.
5. Miller, Tyller G., Environmental Science, Thompeson Brooke / Cole, Singapore,2004.
6. Vijayalakshmi, G.S. Murugesan A.G. and Sukumaran, N., Basic Environmental Science, ManonmaniamSundaranar University Publications, Tirunelveli,2006.

SEMESTER-IV			
CORE – VI – PROGRAMMING IN C++			
Code : 15UPHC41	Hours/week:4	Hrs/ Semester: 60	Credits :4

Objectives:

- To have knowledge about the aspects of C++ language
- To apply C++ language to write various programs for solving some important problems in physics

Unit I: Introduction, Tokens, Operators and Expressions

Introduction to Digital computer – Block diagram – Algorithm – flowchart – What is C++? – Character set – C++ Tokens– keywords – identifiers – basic data types – user defined data types – derived data types – symbolic constants – declaration of variables – dynamic initialization of variables – reference variables – Operators in C++ – scope resolution operator.

Expressions – Special assignment expressions – Implicit conversions – Hierarchy of arithmetic expressions – Operator precedence – library functions – statements. Structure of a simple C++ program – Implementation of a C++ program – Control structures.

Unit II: Arrays, Functions, Classes and Objects

One dimensional array – Two dimensional arrays – Functions in C++ – the main function – function prototyping – call by reference – return by reference – inline functions - default arguments.

Specifying class – A simple class example – creating objects – accessing class members – defining member functions – nesting of member functions – private member functions – arrays within a class – arrays of objects – objects as function arguments – returning object.

Unit III: Constructors and Operator Overloading

Constructors – parameterized constructors – multiple constructors in a class dynamic constructor – copy constructors – destructors.

Introduction – defining operator over loading – over loading unary operators – overloading binary operators – manipulation of strings using operators – rules for overloading.

Unit IV: Inheritance and Managing Console I/O Operations

Inheritance – introduction – defining derived class – single inheritance – multilevel inheritance – multiple inheritance – hierarchical inheritance – hybrid inheritance.

C++ streams – C++ stream classes – unformatted I/O operations – formatted console I/O operations – manipulators – managing output with manipulators – designing our own manipulators.

Unit V: Working with files

Classes for file stream operations – opening and closing a file – detecting end-of-file – more about open() file modes – file pointers and their manipulations – sequential input and output operations – Updating a file : Random Access.

Text Book :

1. E. Balagurusamy, Object oriented programming with C++, Tata McGraw-Hill publishing company Ltd. New Delhi. 2nd Reprint 2008.

Book for Reference:

1. D. Ravichandran, Programming in C++, Tata Mc. Graw Hill Publishing company Ltd. New Delhi.

SEMESTER IV			
ALLIED PHYSICS – PAPER II - II B.Sc., Chemistry			
Code : 15UPHA41	Hrs/Week: 4	Hrs/ Semester: 60	Credits : 4

Objectives:

- To study about Coulomb's law & Gauss law and its applications
- To determine self inductance using Ballistic Galvanometer
- To derive Schrodinger's equation and to know uncertainty principle
- To understand logic gates as universal building blocks
- To study about solar energy and its applications

Unit I: Electrostatics

Coulomb's law – Electric field and field intensity – Electric field due to point charge – Electric dipole – Electric flux – Gauss law – Applications – Electric field due to a charged conducting sphere (point inside and point outside) – Uniformly charged cylinder (line charge) – Electric potential – Potential difference – Relation connecting electric field and electric potential at a point – Equipotential surface.

Unit II: Electromagnetism

Faraday's laws of induction – Induced current and charge – Self induction – Self inductance of toroidal solenoid - Determination of self inductance using Rayleigh method - Mutual inductance – Coefficient of coupling – Determination of mutual inductance using B.G.

Unit III: Relativity and Wave mechanics

Frame of reference – Galilean transformation – Postulates – Lorentz transformation – De Broglie's theory of matter waves – De Broglie wavelength – Wave function – Postulates of quantum mechanics – Schrodinger wave equation – Time dependent form.

Unit IV: Digital electronics

Binary numbers – Conversion of decimal number into binary number – Binary to decimal – Binary addition – Multiplication – Subtraction by 2's complement – Basic logic gates - OR , AND, NOT, NOR, NAND gates – De Morgan's laws – Boolean equations and logic circuit from truth table – NOR and NAND gates as universal building blocks – Binary adder – Half adder.

Unit V: Energy Physics

World's reserve of commercial energy source and their availability – Various forms of energy – Conventional and non conventional energy sources – Solar energy –

Photo voltaic effect – Photo voltaic cells – Conversion of solar energy into electricity – Solar cells – Solar heaters – Wind energy – Power of wind – Wind mill – Wind farms – Energy crisis and possible solutions – Global warming.

Text Books:

1. A. Ubald Raj & G. Jose Robin, Allied Physics, Indra Publications 2012.
2. R. Murugesan, Modern Physics, S. Chand & Co. 2011.

Book for Reference:

1. G. D. Rai, Solar energy Utilization, Khanna Publishers, V edition, 7th reprint 2008.
2. Brijlal N. Subramanian, Electricity & Magnetism, Ratan Prakashan Mandir, 14th revised edition, (1985).
3. K. K. Tewari, Electricity and magnetism – Published by Sultan Chand & Co, Reprint-2nd edition 1994.
4. Milman and Taub, Integrated Electronics - International student edition, (TMH)

SEMESTER-IV			
SBE– BIO MEDICAL INSTRUMENTATION			
Code : 15UPHS41	Hours / week :2	Hrs/ Semester: 30	Credits :2

Objectives

- To have the functional elements of measuring instruments
- To acquire the knowledge on the application of Physics in the field of medicine

Unit I: Human Physiological Systems

Introduction – Cells and their structures – Nature of Cancer cells – Transport of ions through the cell membrane – Resting and action potentials – Nerve tissues and organs – Different systems of human body.

Unit II: Biosignal Acquisition

Introduction – Physiological signal amplifiers – Isolation amplifiers – Medical preamplifier design – Bridge amplifiers.

Unit III: Biopotential Recorders & Assist Devices

Introduction – Characteristics of the recording system – Electrocardiography(ECG) - Electroencephalography(EEG) – Introduction – Pacemakers – Pacemaker batteries – Artificial heart valves.

Unit IV: Specialised Medical Equipment

Introduction – Blood cell counter – Electron microscope – Radiation detectors – GM Counter, Bubble Chamber – Photometer – Filter photometer, Spectrophotometer – Chromatography – Audiometers.

Unit V: Advances in Biomedical Instrumentation

Introduction – Computers in medicine – Lasers in medicine – Endoscopes - Cryogenic surgery – Computer tomography.

Text Book:

1. Dr.N. Arumugam, Bio-medical Instrumentation, Anuradha Publications, reprint 2014.

SEMESTER-IV			
Foundation Course: Yoga and Meditation			
Code : 15UFYM41	Hours / week :2	Hrs/ Semester: 30	Credits :2

Objectives

- To enable students to have good health
- To impart value for mental hygiene and possess emotional stability
- To integrate moral values in order to live a purpose driven life.

Unit I: Physical character and functions

Yoga – Brief introduction – importance of Yoga Life – Simple methods for adopting Yoga in Daily Life – Nature Cure: Brief history and principles – Health and disease – Techniques of healthy living – rules & regulations – asanas, pranayama, mudra, bandha

Unit- II: Exploring the traditions of Yoga:

The secret of change – The mind: Agent of change – The twelve steps of spiritual recovery – Raja yoga – Hatha Yoga – Jnana Yoga – Karma Yoga – Bhakthi Yoga – Mantra Yoga – Tantra Yoga – Surya namaskar

Unit- III: Greatness of life force

Philosophy of kayakalpa – physical body – bio magnetism, mind – kayakalpa practical – sex and spirituality – value of sexual vital fluid, married life – chastity – jeevasamadhi – intensifying bio magnetism through exercise – lamp gazing – rules – benefits – mirror gazing – rules – benefits, passes for healing.

Unit – IV: Self Discipline

Self-discipline, diet: You are what you eat – Yogic and naturopathic treatment for common ailments: common cold, cough, headache, constipation, gastric trouble, menstrual disorders – obesity – and general steps for being healthy.

Unit- V: Special Meditation

Pranayama – physiological value of pranayama – practice of pranayama – nature meditations

Books for Reference:

1. Mind – Vethathiri Maharashi
2. Karma Yoga - Vethathiri Maharashi
3. Sound health through Yoga – Dr. K. Chandrasekar
4. Yoga for Modern Age – Vethathiri Publications, Department of AYUSH, Yogic and Naturopathic treatment for Common Ailments, Edi.IV, Ministry of health and family welfare, Govt. of India, 2010
5. Georg Feuerstein & Benda Feuerstein, Yoga: A beginners Guide, Rashmi Graphics, #3, Amrutwel CHS. Ltd., Mumbai, 2014

SEMESTER- II			
PRACTICAL II			
Code : 15UPHPR2	Hours / week :2	Hrs/ Semester: 30	Credits :2

Any 14 experiments:

1. Potentiometer – Calibration of low range voltmeter.
2. Potentiometer- R1/R2 and specific resistance
3. Potentiometer – Ammeter calibration
4. LCR series resonance circuit
5. LCR parallel resonance circuit
6. Absolute capacity of a capacitor –B.G
7. Desauty's Bridge -Determination of C in series & parallel
8. Comparison of E1/E2 & C1 /C2 –B.G
9. Bridge rectifier
10. Zener Characteristics
11. RC and LC filters
12. Amplifier CE mode – Without feedback
13. Spectrometer –Normal incidence -Grating
14. Spectrometer – i-d curve - Prism
15. Owen's bridge
16. Field along the axis of the coil – m & BH

SEMESTER IV			
ALLIED PHYSICS PRACTICALS - II B.Sc., CHEMISTRY			
Code : 15UPHAR1	Hrs/Week: 2	Hrs/ Semester: 30	Credits : 2

Any 12 experiments

1. Young's modulus – Uniform bending – Pin and microscope
2. Young's modulus – Non-uniform bending – Scale and telescope
3. Rigidity modulus – Torsionpendulum
4. Specific heat capacity of liquid – Newton's law of cooling
5. A. C. frequency – Sonometer
6. Spectrometer – Dispersive power of the prism
7. Spectrometer – Grating – Oblique incidence
8. Air wedge – Thickness of a wire
9. Potentiometer – Calibration of voltmeter by standardization method
10. Potentiometer – Calibration of Ammeter
11. Characteristics of Zener diode
12. Basic logic gates – OR, AND and NOT
13. Series resonance circuits
14. Parallel resonance circuits
15. Co-efficient of viscosity – Stoke's method
16. Surface tension – Capillary rise method.
17. Compound pendulum - g

SEMESTER V			
CORE – VII – DIGITAL ELECTRONICS			
Code: 15UPHC51	Hours/Week: 5	Hrs/ Semester: 75	Credits : 5

Objectives:

- To gain knowledge about the binary numbers, Boolean Algebra and FlipFlops.
- To study the construction and working of Registers, Counters , A/D and D/AConverters.

Unit I: Number System and Logic Gates

Decimal, binary, hexadecimal, binary-coded decimal numbers – conversion of one into another – addition, subtraction of binary numbers by 2's complement method. Digital circuits – logic gates–positive logic and negative logic systems–Basic logic gates–AND, OR, NOT gates – characteristics of logic gates–NOR, NAND gates – Exclusive OR gate –Boolean equation of logic circuits– Boolean equation and logic circuits from truth table– standard forms of expressing logic functions–Boolean algebra–De Morgan's law– NAND, NOR as universal building block–Binary adder–Half adder–Full adder–Half subtractor–Full subtractor.

Unit II: Karnaugh Map

Karnaugh map –Two variable map–Three variable map–four variable map–method of addressing a cell in map–preparation of truth table from Karnaugh map–Don't care conditions–simplification of product of sums (Karnaugh map using Max terms).

Unit III: Binary Adders and converters

Parallel binary adder – Parallel subtractor using 2's complement system – BCD Adder-Excess 3 code – Excess 3 Adder – Parity Generator and Parity Checker, variable resistor networks, binary ladders, D/A converters, D/A Accuracy and Resolution, A/D converter – simultaneous Conversion, continuous A/D conversion.

Unit IV: Flip –Flops and 555 Timer

IC 555 Timer as Monostable and AstableMultivibrator – RS Flip flop – clocked RS flip flop – JK Flip flop – JK Master Slave Flip flop – Divide by 2 counters with D Flip flop –T Flipflop.

Unit V: Counters and Registers

Binary counter–Decade counter–Up down counter –Synchronous and asynchronous counters –Shift register–Registers with parallel load –serial transfer in register.

Text Books:

1. G. Jose Robin, A.Ubald Raj, Integrated Electronics.
2. Albert Paul Malvino and Donald P. Leach, Digital principles and applications, 7thedition2013.

Books for Reference:

1. Millman and Taub, Integrated Electronics, International student edition,(TMH)
2. R. P. Jain, Modern digital Electronics, Tata McGraw Hill Pvt. Ltd., 4thReprint 1988.

SEMESTER V			
CORE – VIII – SOLID STATE PHYSICS			
Code: 15UPHC52	Hours/Week: 4	Hrs/ Semester: 60	Credits : 4

Objectives

- To know about the structure of crystals
- To study the properties of crystals
- To study the electron theory of solids
- To know about superconductivity

Unit I: Crystal structure and crystal planes

Crystal structure – crystal symmetry – combination of symmetry elements – stacking sequences in metallic crystal structures – planes in crystals – Miller indices – distance of separation between successive planes.

Unit II: Crystal defects and dielectric properties

Imperfections in crystals – energy of formation in vacancy defect, Schottky defects and Frenkel defect – line imperfections – surface imperfections – volume defects.

Various polarization processes – Internal field – Clausius - Mossotti equation – frequency and temperature dependence of dielectric constant – dielectric breakdown – applications.

Unit III: Electron theory of metals

Classical free electron theory – quantum theory of free electrons – Fermi distribution function – density of energy states – sources of electrical resistance – electron in a periodic potential – Brillouin zones – effective mass of electron and concept of hole – energy bands in solids.

Unit IV: Magnetic properties

Classification of magnetic materials – Langevin theory of diamagnetism – theory of para magnetism – Weiss theory of ferromagnetism – Domain theory of ferromagnetism – antiferro magnetic materials – ferrites – application of different magnetic materials – magnetic recording, magnetic memories, permanent magnets.

Unit V: Superconductivity and bonding in solids

Superconductivity – Effect of magnetic field – The Meissner effect – Effect of current – Type I and Type II superconductors – thermal properties – isotope effect – London equations – BCS theory – flux quantisation – Josephson's effect – application of superconductors – high T_c superconductor – application of superconductor.

Bonding in solids – cohesive energy – ionic bonding – calculation of cohesive energy of ionic solids – covalent bonding – metallic bonding – hydrogen bonding – molecular bonding.

Text Book:

1. Solid state Physics – P.K. Palanisamy, Copy right (2003) Scitech publication (India) Pvt. Ltd., Chennai. 3rdReprint(2008).

Books for Reference:

1. R. Murugesan, KiruthigaSivaprasath, Modern Physics, S.Chand&Co.Ltd., Revised edition(2007)
2. M. Arumugam, Solid State Physics, Anuradha agenciespublishers, Kumbakonam, Reprint(2008)
3. Dr. P. Mani, A Text book of Engineering Physics, Dhanam PublicationsChennai, Revised edition(2008).
4. C. Kittel, Solid state Physics, John Wiley & Sons, New Delhi, Reprint(1993).

EMESTER-V			
CORE – ELECTIVE I – RENEWABLE ENERGY SOURCES			
Code : 15UPHE51	Hours / week :4	Hrs/ Semester: 60	Credits :4

Objectives:

- To know about various forms of conventional energysources
- To study about the solar radiation measuringequipments
- To study the different types of solar waterheaters
- To study the utilization of solarenergy
- To know about the biological conversion of solarenergy

Unit I: Solar Energy

Introduction – solar constant – solar radiation at the earth’s surface – solar radiation measurements – solar radiation data – flat-plate collectors – concentrating collector: Focusing type – advantages and disadvantages of concentrating collectors over flat-plate type collectors.

Unit II: Solar Energy Storage and applications

Introduction– solar energy storage systems – solar pond – space heating (passive) – solar electric power generation – basics of solar photo-voltaics – solar distillation – solar pumping – solar cooker (box type) – solar green houses.

Unit III: Wind Energy

Introduction – basic principles of wind energy conversion – the nature of the wind – the power in the wind (only theory) – forces on the blades – wind energy conversion – wind data and energy estimation – site selection considerations – basic components of a WECS(Wind Energy Conversion System) – classification of WEC systems – advantages and disadvantages of WECS – types of wind machines (wind energy collectors) – horizontal-axial machines (advantages and disadvantages) – vertical-axis machines (advantages and disadvantages) – energy storage – applications of wind energy – safety systems – environmentalaspects.

Unit IV: Energy Conservation

An economic concept of energy – principles of energy conservation and energy audit – energy conservation approach – co-generation – waste heat utilization – combined cycle power generation – heat recuperators – heat generators – energy storage – instrumentation andcontrol.

Unit V: Other conventional energy sources

Biomass energy – classification – photosynthesis – biogas generation – gobar gas plants (KVIC) – wood gasification – advantages and disadvantages of biomass as energy

source – geothermal energy, wind energy (basic ideas) – ocean thermal electric conversion (OTEC) – method and working principle of closed OTEC.

Text Book:

1. G. D. Rai, Non conventional Energy Sources, Khanna Publishers, Reprint2014.

SEMESTER V			
CORE – ELECTIVE II – OPTO ELECTRONICS & FIBRE OPTICS COMMUNICATION			
Code : 15UPHE52	Hrs/Week: 5	Hrs/ Semester: 75	Credits : 4

Objectives:

- To know the biasing methods and to measure mobility, current density in semiconductors
- To have a knowledge about different types of diodes
- To study the importance of optical sources (laser)
- To study the properties of fibers and its fabrication
- To study the communication methods with optical fibers

Unit I: Optical characteristics of semiconductors

Direct band gap of semiconductors, indirect band gap of semiconductors, optical absorption – experimental demonstration – photoluminescence – electroluminescence – photoconductive decay – experimental measurement of decay – minority carrier mobility by Schokley experiment.

Unit II: Photo diodes

Photo diode - Silicon PIN photodiode - hetero junction diode – APD - LED - phototransistor – photothyristor – photothermistor – photomultiplier – super luminescent diode (SLD).

Unit III: Optical sources

Laser fundamentals – optical resonator – types of laser sources – ruby laser, helium neon laser, four level solid state laser – CO₂ laser – semiconductor laser – opto electronic couplers and parameters – input to output isolation voltage, current transfer ratio and response time.

Unit IV: Fibre characterization and fabrication

Historical background – principle of fibre optics – group delay in step index fibres – wave guide equations for step index fibre – single mode step index fibre – graded index fibre – fibre optic attenuation as a function of wave length – pulse delay and distortion in a single mode fibre – fibre optic characteristics, connectors, couplers and splicing – fibre characterization.

UnitV:Optical communication

Fundamentals of modulation schemes – modulation spectral analysis – analog modulation schemes – pulse modulation schemes – digital modulation schemes – demodulation methods – direct detection methods - heterodyne detection receiver – homodyne detection optical receiver – modulation parameter converters – external optical modulators – electro optic modulator – acoustic optical modulation.

Text Book:

1. Ubald Raj and Jose Robin, Optoelectronics, Indira publications2012.

Books for Reference:

1. Wilson and Hawkes, Opto electronics- An introduction, Prentice Hall of India, New Delhi, Second edition (2001).
2. Battacharya .P, Semiconductor opto electronics, PHI, New Delhi,1995.
3. Dr. M. Arumugam, Optical fibers communication and sensors, Anuradha Agencies (2002).
4. Subir Kumar Sarkar, Optical fiber and fiber optic communications system, S. Chand & company, first edition, Reprint 2008.

SEMESTER-V			
SBE – PHYSICS FOR COMPETITIVE EXAMINATIONS			
Code : 15UPHS51	Hours / week : 4	Hrs/ Semester: 60	Credits :3

Objective:

- To prepare the students for competitive exams and make them competent in facing the challenges with confidence.

Unit I: Fundamentals of Physics

Units – trigonometric – numerical constants – Derivative and Integrals – unit conversion factors – some fundamental physical constants – units and dimensions.

(Refer:S.L.Kakani&Hemarajam - vol 2. Pg XV-XIX)

Unit II: Properties of matter

Gravitation, Escape velocity & artificial satellite (Refer : chapter7) Surface Tension Viscosity.

(Refer:Chapter 8, S.L.Kakani)

Unit III: Heat & Optics

Thermometry – Calorimetry – Thermal expansion – Law of thermodynamics.

(Refer:Objective Physics, Satya Prakash (chapter A (17, 18, 20) – pg.A433 – A471, A499 –A529)

Unit IV:Electromagnetism

Magnetic effect of current – Meters – Magnetism – Electromagnetic induction – Electromagnetic waves.

(Refer: Objective Physics, Satya Prakash (chapter C (5, 6, 7, 8, 10) pg. C179 – C309, C342 – C352)

Unit V: Modern Physics

Quantum nature of light – Atomic models and spectra – X-Rays – radioactivity- Properties of nucleus- Nuclear energy – Matter waves and relativity.

(Refer: Objective Physics, Satya Prakash (chapter D(1, 2, 3, 4, 5) pg. D3-D121)

Text Books:

- Satya Prakash, Er. VibhavSaluja, Objective Physics, A.S.Prakashan publications, Meerut 27th revised edition 2010.
- Dr.S.L. Kakani, Objective Physics, Sultan Chand and sons Ltd., 10th revised edition (2001).

SEMESTER-V			
SELF STUDY PAPER III – BIO PHYSICS			
Code : 15UPHSS3	Hours / week : -	Hrs/ Semester: -	Credits :1

(Compulsory)

Objective:

- To help the students to understand the use of principles of physics in biomedicine.

Unit I: Biomechanics

Biostatics – biophysics of muscle - strength of bones – biodynamics – locomotion on land – locomotion in air – locomotion in water – role of gravity.

Unit II: Biophysics and fluid flow

Steady laminar flow – Poiseuille’s formula – energetic of fluid flow – turbulence – hemodynamics – fluid flow in plants.

Unit III: Biophysics and gas transport

The ideal gas – convective transport of gases – diffusion of gases: Fick’s laws – physiology of respiration.

Unit IV: Biophysics and audition

Transverse and longitudinal waves – physiological characteristic of sound – human ear – phase sensitivity and determination of direction – Doppler effect.

Unit V: Physics of vision

Wave nature of light – Geometrical optics – Refractive power – Retina and photoreceptors – Photoreceptors and fiber optics – Resolving power of eye – Polarization and vision.

Text Book :

1. P.K. Srivatsava, Elementary Biophysics.

SEMESTER- VI			
CORE – IX – MODERN PHYSICS			
Code : 15UPHC61	Hours / week : 6	Hrs/ Semester: 90	Credits : 5

Objectives

- To emphasize the relationship between mass and energy using relativity
- To understand Quantum mechanical principles
- To know about the wave properties of matter
- To understand the concepts atomic structure and spectra
- To know the origin and properties of X-rays

Unit I: Relativity

General theory – Michelson – Morley experiment – postulates of special theory of relativity- Lorentz transformation – Length contraction – Time dilation – Relativistic condition of velocities – Simultaneity – relativistic mass – relativistic momentum – mass and energy equivalence – relation between total energy and rest mass, rest mass energy and momentum.

Unit II: Atomic Structure and Spectra

The vector atom model – quantum numbers associated with vector atom model – coupling schemes – L-S coupling – j-j coupling – Pauli's exclusion principle – application to periodic table – magnetic dipole moment due to orbital and spin motion of the electron – Stern and Gerlach experiment – Zeeman effect – experimental study of Zeeman effect – Larmor's theorem – quantum mechanical explanation of normal Zeeman effect.

Unit III: X – Rays

Production of X- rays – Coolidge tube – properties of X-rays – Bragg's law – Bragg spectrometer – X-ray spectra – characteristic and continuous X- ray spectrum – Moseley's law and its significance – Compton Effect – Compton Effect and its experimental verification.

Unit IV: Wave Properties of Matter

De Broglie's concepts of matter waves – De Broglie's wavelength – wave velocity and group velocity – experimental study of matter waves – Davisson and Germer's experiment – Heisenberg's uncertainty principle – basic postulates of quantum mechanics – derivation of time dependent and time independent Schrodinger's equation – properties of wave function – operators in quantum mechanics – eigen functions, eigen values and eigen value equations.

Unit V: Development of Quantum Mechanics

Introduction – Black body radiation – Theoretical laws of black body radiation – Planck's quantum theory – Photo-electric effect – Einstein explanation of photo electric effect

– the Ritz combination principle in spectra – stability of an atom, Bohr's quantization of angular momentum and its application to the hydrogen atom – Particle in one dimension and three dimensional box.

Text Books :

1. R. Murugesan, Kiruthiga Sivaprasath, Modern Physics, S. Chand & Co. Ltd. 12th revised edition 2006.
2. Kamal Singh, S.P. Singh, Quantum Mechanics, S. Chand & Co Ltd., (1998).

Books for Reference:

1. Brijlal and Subramanyam, Modern Physics, 8th edition (1975), 2007
2. J.B. Rajam, Atomic Physics, 8th edition, S. Chand & Co. (1981)

SEMESTER- VI			
CORE – X- NUCLEAR AND PARTICLE PHYSICS			
Code : 15UPHC62	Hours / week : 6	Hrs/ Semester: 90	Credits : 5

Objectives

- To know about nucleus and its properties
- To understand the phenomenon of radioactivity
- To understand nuclear reactions
- To gain basic knowledge of elementary particles

Unit I: Nucleus

Constitution – proton neutron hypothesis – types of nuclei – properties – size(radius) – mass, density – charge – packing fraction – mass defect – binding energy – stability – nuclear spin – nuclear magnetic moment – nuclear force – Yukawa's theory – liquid drop model – Weizsaker semi-empirical mass formula – shell model – evidence for shell model – magic numbers – neutrons – properties – charge, mass, spin, magnetic moment – types of neutron.

Unit II: Radioactivity

Natural radioactivity – Radioactive transformation – displacement law – decay law – disintegration(decay) constant – half life – mean life – radioactive series – radioactive equilibrium – secular and transient – radio carbon dating – alpha rays – specific charge, range – Geiger law – Geiger-Nuttal law - theory of alpha decay – beta rays – specific charge – beta ray spectrum – gamma rays – interaction of gamma rays with matter.

Unit III: Nuclear Reactions

Nuclear reactions – General features – Direct and Compound nuclear reaction – Q-Value of nuclear reactions – Q-value transmutation by alpha particles, protons, deuterons, electrons and neutrons – scattering cross section – induced radioactivity – preparation of radio element – Applications of radioisotopes.

Nuclear fission – chain reaction – nuclear fusion – source of stellar energy – thermonuclear reactions – hydrogen bomb – controlled thermonuclear reactions, transuranic elements.

Unit IV: Nuclear Reactors, Particle Accelerators and Detectors

Nuclear reactor – uses of nuclear reactor – Linear accelerator – Cyclotron – Synchrocyclotron - Betatron – Ionization chamber - Geiger Muller counter – Scintillation counter – Wilson cloud chamber.

Unit V: Elementary Particles

Classification of elementary particles – Leptons and their properties – lepton number – pion and muon decay schemes – hadrons – baryons – baryon number – resonance particles.

Text Books:

1. R. Murugesan, Kiruthiga Sivaprasath, Modern Physics, S. Chand & Co. Ltd., 12th revised edition, 2006.
2. A.B. Gupta, Modern Physics, 1st edition - Book & Allied Pvt. Ltd., (2006).

Books for Reference:

1. Chopra and Sehgal, Modern Physics, 5th revised edition – Sultan Chand & Sons, New Delhi (1992).
2. D.C. Tayal, Atomic and Nuclear physics, 3rd revised edition – Himalaya Publishing House (1998).

SEMESTER- VI			
CORE – XI– PROJECT			
Code : 15UPHC63	Hours / week : 5	Hrs/ Semester: 75	Credits : 5

(1) PROJECT GUIDELINES:

The objective of the course is to train the students so that each student has the confidence to carry out independent work, group work and experience in handling of various equipments.

A maximum of five students can combine together and do a project. Students are given the freedom of choosing the topic of the project. It may be theoretical or practical and may be from any one of the following areas

- a) Physics-Theoretical
- b) Physics -Experimental
- c) Electronics
- d) ComputationalPhysics
- e) MicroProcessor
- f) Interdisciplinary projects involving concepts ofphysics

Students are supposed to carry out the project in about 30 hours in a laboratory. The students must present the first oral report at the end of the first month, the second oral report at the end of the second month and final report at the end of approximately the third month. Students are to submit a group project report (dissertation) with a minimum of 25 pages.

Students are encouraged to take it as a challenge so that the result of the project shall be approved for publication in a leading journal.

SEMESTER- VI			
CORE – ELECTIVE III – ADVANCED PHYSICS			
Code : 15UPHE61	Hours / week : 5	Hrs/ Semester: 75	Credits : 4

Objectives:

- To know about laser and its application in medicine industry
- To know about Microprocessor architecture.
- To study ‘what is Nanomaterial’, its importance and applications

Unit I: Applications of Laser

Application of laser in material processing – Laser drilling – laser cutting – Laser welding – Experimental welding – Air pollution monitoring – Water pollution monitoring – Propagation of laser radiation through atmosphere – Laser remote sensing – LIDAR – Raman LIDAR – Sensing wind velocity using laser – Holography – Applications.

Unit II: Microprocessor architecture

Microprocessor - Microprocessor instruction set and computer language – Microprocessor architect and its operations – Input and output devices - Microcomputer system – Logic devices for interfacing – 8085 MPU.

Unit III: Programming the 8085

8085 programming model – Instruction classification – Instruction and data format – How to write, assemble and execute simple programs – Instruction set – Data transfer operations – Addressing modes – Arithmetic operations – Logical operations – Branching operations.

Unit IV: Nanomaterials

Nanomaterials: Synthesis – Plasma arcing – Chemical vapour deposition – Sol gels – Electro deposition – Ball milling – Properties of nano particles and applications. Carbon nano tubes: Fabrication – Arc method – Pulsed laser deposition – Chemical vapour deposition – Structure – Properties – Applications.

Unit V: Materials For Nuclear and Space Applications

Nuclear fuels – fuel cladding – moderators, control materials – coolants – shielding materials – Space programme – structural material and their properties – system requirements – extreme high temperature materials for thermal protection – pressure vessels – lubrication.

Text Books:

1. R. Murugesan, Optics and spectroscopy, S. Chand & Co.(1995).
2. Ramesh Gaonkar, Microprocessor Architecture, Programming and Applications with the 8085, Penram International Publishing (India) Private Limited, Fifth edition, 2011
3. Dr. P. Mani, A text book of Engineering Physics II, DhanamPublications.
4. CM Sri Vastava, C & C. Srinivasan, Science of Engineeringmaterials

Books for Reference:

1. Physics education, volume 19, No.1, April – June2002
2. Dr. Arumugham, Bio medical instrumentation, Anuradha Agencies, Reprint2014.
3. M. H. Fulekar, Nano Technology, LK International PublicHouse.

SEMESTER- VI			
PRACTICAL III – NON ELECTRONICS			
Code : 15UPHPR3	Hours / week : 3	Hrs/ Semester: 45	Credits : 4

Any 14 experiments:

1. Spectrometer – Cauchy's constants
2. Grating – Oblique incidence
3. Spectrometer – Hartmann's formula
4. Spectrometer – $i-i'$ -curve
5. B. G – Comparison of mutual inductance.
6. B. G – Absolute determination of mutual inductance
7. B. G – High resistance by leakage
8. M. G – Thermoe.m.f.
9. Potentiometer – Temperature coefficient
10. Potentiometer – Calibration of high range voltmeter
11. Carey Foster's Bridge – Unknown Resistance
12. Conversion of a galvanometer into ammeter and voltmeter.
13. Spectrometer – Biprism
14. Anderson's Bridge – Self Inductance
15. Verification of Network's theorem – Thevenin's and Norton's theorem
16. Thermistor
17. Calcite Prism – Refractive Index

SEMESTER- VI			
PRACTICAL IV – ELECTRONICS			
Code : 15UPHPR4	Hours / week : 3	Hrs/ Semester: 45	Credits : 4

Any 14 experiments:

1. Dual power supply – using IC
2. Logic circuits (OR, AND, NOT, NAND and NOR) using discrete components
3. Single stage amplifier with and without feedback
4. Hartley oscillator
5. Colpitt's oscillator
6. Astable multivibrator – using 555 Timer
7. OP AMP – Adder and Subtractor
8. OP AMP – Differentiator and Integrator
9. OP AMP – Low pass and high pass filters
10. Verification of De Morgan's laws
11. Half and Full Adder
12. NAND and NOR as Universal building blocks
13. Solving Boolean expression
14. Monostable multivibrator – using 555 Timer
15. OP AMP – characteristics
16. Half and Full subtractor

SEMESTER- VI			
PRACTICAL IV – COMPUTER PROGRAMMING – C++			
Code : 15UPHPR5	Hours / week : 2	Hrs/ Semester: 30	Credits : 4

Any 14 experiments:

1. Simple arithmetic operations (i.e. addition, subtraction, multiplication and division) using do-while loop.
2. Name of the day in a week using Switch–case statement.
3. Validity of any entered character (whether it belongs to the alphabetical set or a number or a special character) using if else.
4. Quadratic equation.
5. Sum of the series using for loop.
 - a. $\text{Sum}=1+3+5+\dots\dots\dots n.$
 - b. $\text{Sum}=x-x^3/3!+x^5/5!-x^7/7!+\dots\dots\dots x^n/n!$
 - c. $\text{Sum}=1^2+2^2+4^2+\dots\dots\dots n^2$
6. Matrix addition and its transpose.
7. Multiplication of two matrices.
8. The largest number in the given array and sort them in ascending or descending order using function declaration.
9. Factorial of a number using function declaration (with /without using the return statement)
10. (a) Displaying the content of an array using pointer arithmetic
(b) Displaying the current date (such as day, month and year) using member function
11. Fibonacci numbers using constructor
12. Student details using inheritance concept.
13. Period of a pendulum of given length L.
14. Young’s modulus from the data obtained from uniform bending method.
15. Bank account (Data members: Name of the depositor, Account Name, Type of account, Balance amount in the account and Member functions are to assign initial values, deposit an amount, withdraw an amount, display name and balance)

NME SYLLABUS

SEMESTER- III			
Part-III - NME - ELECTRONICS (For other major students by Dept. of Physics)			
Code : 15UPHN31	Hours / week : 2	Hrs/ Semester: 30	Credits : 2

Objectives:

1. To study the theorems in Linear circuit analysis
2. To study the characteristics of PN junction diode
3. To understand the functioning of a Transistor in different modes
4. To know about the applications of transistor in amplifier and operational amplifier

Unit I: Linear circuit analysis

Ohm's law - constant voltage and constant current sources - Thevenin's theorem- Norton's theorem - Problems.

Unit II: Diode

Intrinsic and Extrinsic semiconductors - n type and p type semiconductors - PN junction- Biasing of PN junction- Diode characteristics.

Unit III: Transistor

Junction transistor - Biasing the transistor - transistor characteristics in CE configuration.

Unit IV: Amplifier

AC emitter resistance, transistor- β for CE configuration- Analysis of RC coupled CE amplifier.

Unit V: Operational Amplifier

Op-amp Characteristics - Non inverting feedback amplifier - Inverting feedback amplifier -Virtual ground - Summing amplifier – Integrator- Differentiator.

Book for study

1. Elements of solid state electronics - A.Ambrose & T. Vincent Devaraj ,
Mera publications, reprint (1993).

Book for reference

1. Ancillary Physics –V.T. Sadasivan ,M.Palaniappan, N.Venkatachalam, L.M.N.
Publications, 1st edition (1992).
2. Ancillary Physics – Volume II – A.Ubald Raj & G. Jose Robin.Indra publication, revised
edition(2005).
3. Basic electronics and linear circuits- N.N. Bhargava, D.C. Kulshreshtha, S.C. Gupta, Tata
MC Graw- Hill publishing company Ltd., reprint (1988).

SEMESTER- IV			
Part-III - NME - Applied Physics			
(For other major students by Dept. of Physics)			
Code : 15UPHN41	Hours / week : 2	Hrs/ Semester: 30	Credits : 2

Objectives:

- To acquire knowledge about fuse, earthing and wiring
- To understand the working of home appliances
- To learn about renewable energy sources

Unit I: Domestic wiring

Tools – Precaution in handling tools used for wiring – Types of wires – Cables – Systems of domestic wiring – Tests to be carried out on wiring installation before commissioning

Unit II: Earthing and Fuses

Good grounding and its need – Earthing through a GI pipe – Earthing through a plate-Fuses –Testing the fuses – Types of fuses – Switches

Unit III: Electric appliances

Electric bell – Electric iron – Electric kettle – Hot plate –Fan connection – Lamps (fluorescent lamps) – Washing machine.

Unit IV: Solar energy and its applications

Introduction – Nature of solar radiation - Solar furnace– Solar pumping – Solar cooking —Solar heaters – Solar ponds– Photo voltaic generation - Merits and demerits of solar energy

Unit V: Other Renewable Energy Sources

Conventional and non conventional energy sources – Wind energy – Wind mill – Construction, working and application – Tidal energy – Construction and working – Geothermal energy and its applications

Books for study:

1. Applied Physics – A. Ubald Raj and G. Jose Robin, Indira Publications, 1998.
2. Non conventional energy sources-G. D. Rai, Khanna Publishers, IV edition, 5th reprint 1999.

Book for reference:

1. Perspectives of Applied Physics – Major Henry Alex Devadoss – Jeeva Publications (1998).

**Self Study Paper
(Compulsory)**

SEMESTER V	
SELF STUDY PAPER –III – BIO PHYSICS	
Code : 15UPHSS3	Credits : 1

Objectives:

- To help the students to understand the use of principles of Physics in Biomatics.

Unit I: Biomechanics

Biostatics - Biophysics of Muscle - Strength of bones – Biodynamics - Locomotion on land Locomotion in air - Locomotion in water - Role of Gravity.

Unit II: Biophysics and fluid flow

Steady Laminar flow - Poiseuille's formula - Energetic of fluid flow - Turbulence-Hemodynamics - Fluid flow in plants.

Unit III: Biophysics and gas Transport

The ideal gas - Convective transport of gases - Diffusion of gases: Fick's Laws -Physiology of respiration.

Unit IV: Biophysics and Audition

Transverse and Longitudinal waves - Physiological characteristic of sound - Human Ear -Phase sensitivity and determination of direction - Doppler effect.

Unit V: Physics of Vision

Wave nature of light - Geometrical optics - Refractive power - Retina and photoreceptors - Photoreceptors and fiber optics - Resolving power of eye - Polarization and vision.

Book for Study:

1. Elementary Biophysics By P.K. Srivatsava