J.J. COLLEGE OF ARTS AND SCIENCE, PUDUKKOTTAI – 622 422.

B.Sc. Physics Course Structure under CBCS

(For the candidates admitted from the academic year 2016-2017 onwards)

Semester	Part	Code	Course	Title	Instr. Hours/ Week	Credit	Exam Hours	Marks		Total
								Int.	Extn.	
	I	U1RTL1/HL1/ FL1	Language Course – I (LC) – Tamil*/Other Languages ** #		6	3	3	25	75	100
I	II	U1REL1	English Language Course –I (ELC)		6	3	3	25	75	100
	III	U1RPHCC1	Core Course – I (CC)	Properties of Matter	6	5	3	25	75	100
			Core Course – II (CC)	Major Practical - I	3	-	***	-	-	-
		U1RTAC1	First Allied Course –I (AC)	Mathematics – I Calculus and Fourier series	5	3	3	25	75	100
			First Allied Course – II (AC)	Algebra, analytical geometry of 3D and trigonometry	4	-	***	-	-	-
				Total	**30**	**14**				**400**
II	I	U2RTL2/HL2/ FL2	Language Course – II (LC) - Tamil*/Other Languages ** #		5	3	3	25	75	100
	II	U2REL2	English Language Course – II(ELC)		5	3	3	25	75	100
	III	U2RPHCC2P	Core Course – II (CC)	Major Practical - I	3	5	3	40	60	100
		U2RPHCC3	Core Course – III (CC)	Mechanics and Relativity	5	5	3	25	75	100
		U2RMTAC2	First Allied Course – II (AC)	Algebra, analytical geometry of 3D and trigonometry	3	3	3	25	75	100
		U2RMTAC3	First Allied Course – III (AC)	Mathematics III ODE, PDE, Laplace transforms and vector calculus	4	3	3	25	75	100
	IV	U2RES	Environmental Studies		3	2	3	25	75	100
	V	U2RVE	Value Education		2	2	3	25	75	100
				Total	**30**	**26**				**800**

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B.Sc. Physics Course Structure under CBCS

(For the candidates admitted from the academic year 2016-2017 onwards

Semester	Part	Code	Course	Title	Instr. Hours /Week	Credit	Exam Hours	Marks		Total
								Int.	Extn.	
III	I	U3RTL3/ HL3/FL3	Language Course – III (LC)– Tamil*/Other Languages ** #		5	3	3	25	75	100
	II	U3REL3	English Language Course- III (ELC)		5	3	3	25	75	100
	III	U3RPHCC4	Core Course – IV (CC)	Thermal physics and Statistics	5	5	3	25	75	100
		U3RPHCC5	Core Course – VI (CC)	Electricity, Magnetism & Electromagnetism	5	5	3	25	75	100
			Core Course – V (CC)	Major Practical - II	3	-	***	-	-	-
		U3RCHAC4	Second Allied Course – I	.Allied Chemistry	4	3	3	25	75	100
			Second Allied Course – II	Allied Chemistry practical	3	-	***	-	-	-
				Total	**30**	**19**				**500**
IV	I	U4RTL4/ HL4/FL4	Language Course –IV (LC) - Tamil*/Other Languages ** #		5	3	3	25	75	100
	II	U4REL4	English Language Course – IV (ELC)		5	3	3	25	75	100
	III	U4RPHCC6P	Core Course – V (CC)	Major Practical II	3	5	3	40	60	100
		U4RPHCC7	Core Course – VI (CC)	Analog Electronics	5	5	3	25	75	100
		U4RCH	Second Allied Course - II	Allied Chemistry practical	3	3	3	40	60	100

		AC5P								
		U4RCHAC6	Second Allied Course - III	Allied Chemistry	5	3	3	25	75	100
	IV	U4RPHSBE1	Skill Based Elective I	Laser Physics	4	2	3	25	75	100
				Total	**30**	**24**				**700**

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B.Sc. Physics Course Structure under CBCS

(For the candidates admitted from the academic year 2016-2017 onwards)

Semester	Part	Code	Course	Title	Instr. Hours /Week	Credit	Exam Hours	Marks		Total
								Int.	Extn.	
V	III	U5RPHCC7	Core Course – VII (CC)	Optics & Spectroscopy	5	5	3	25	75	100
		U5RPHCC8	Core Course – VIII (CC)	Atomic & Nuclear Physics	5	5	3	25	75	100
		U5RPHCC9	Core Course – IX (CC)	Digital Electronics	5	5	3	25	75	100
			Core Course – X (CC)	Major Practical III	3	-	***	-	-	-
			Core Course – XI (CC)	Major Practical IV	3	-	***	-	-	-
		U5RPHMBE1	Major based Elective – I	Material Science	5	4	3	25	75	100
	IV	U5RPHSBE2	Skill based Elective –II	Photography	2	2	3	25	75	100
		U5RPHIDC1	Inter Disciplinary Course - I	Introduction to computer	2	3	3	25	75	100
				Total	**30**	**24**				**600**
VI	III	U6RPHC	Core Course – X (CC)	Major Practical III	3	5	3	40	60	100

		C10								
		U6RPHCC11	Core Course – XI (CC)	Major Practical IV	3	5	3	40	60	100
		U6RPHCC12	Core Course – XII (CC)	Elements of Theoretical Physics	5	5	3	25	75	100
		U6RPHCC13	Core Course – XIII (CC)	Microprocessor and applications	5	5	3	25	75	100
		U6RPHMBE2	Major based Elective II	Computer Programming – C Language	5	4	3	25	75	100
		U6RPHMBE3	Major based Elective III	Nano-Science	5	4	3	25	75	100
	IV	U6RPHSBE3	Skill based Elective –II	Physics for home appliances	2	2	3	25	75	100
		U6RPHIDC2	Inter Disciplinary Course - I	Introduction to internet concepts	2	2	3	25	75	100
		U6RGS	Gender Studies		-	1	3	25	75	100
	V		Extension activities		-	1	-	-	-	-
				Total	**30**	**34**				**900**
				Grand Total		**140**				**3900**

SEMESTER-I: CORE COURSE-I: PROPERTIES OF MATTER		
Course Code : U1RPHCC1		**Max. Marks : 100**
Hours/Week : 6		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To understand elastic properties and modulus of the materials.
- To study the principles of surface tension and viscosity.
- To study the basic principles of gravitation.

UNIT-I: ELASTICITY

Introduction − Hooke's law − stress − stain diagram − different moduli of classify − Poisson's ratio − relation between angle of shear and linear strain − relation between volume strain and linear strain − relation between the elastic moduli − determination of Poisson's ration for rubber − work done in stretching a wire − determination of rigidity modulus static torsion method (Scarle's apparatus scale and telescope) − rigidity modulus by torsion pendulum (wire)

UNIT-II: BENDING OF BEAMS

Introduction − expression of bending moment − expression for the depression of the loaded end of a cantilever − young's modulus by cantilever depression − oscillations of a cantilever − determination of young's modulus by non-uniform bending − experiment to determine young's modulus by Koenig's method − uniform bending − expression for elevation − experiment to determine young's modulus using microscope.

UNIT-III: SURFACE TENSION

Introduction for surface tension − definition of surface tension − dimension of surface tension − explanation of surface tension on kinetic theory − pressure difference across a liquid surface − excess pressure inside a liquid drop − excess pressure inside a soap bubble − excess pressure inside a curved liquid surface − experiment determination of surface tension − Jaeger's method advantages and disadvantages − variation of surface tension with temperature.

UNIT-IV: VISCOSITY

Introduction − derivation of Poiseuille's formula − corrections to Poiseulle's formula − Poiseuille's method for determining coefficient of viscosity of a liquid (variable pressure head) − rate of flow of liquid in capillary tube − Poiseuille's formula − variation of viscosity of a liquid with temperature − study of the variation of viscosity of a liquid (water) with temperature − application of viscosity.

UNIT-V: GRAVITATION

Newton's law of gravitation − Kepler's law of planetary motion − determination of G-Boy's experiment − gravitational field and gravitational potential − gravitational potential and field due to a spherical shell − gravitational potential and field due to a solid sphere − variation of g with latitude − variation of g with altitude − variation of g with depth − the compound pendulum

BOOKS FOR STUDY:

1. properties of matter, Brijlal and Subramaniyam.
2. properties of matter, R. Murugesan.

BOOKS FOR REFERENCE:

1. Properties of matter – D.S.Mathur.
2. Properties of matter – Subramania Iyer and Jeyaraman.

SEMESTER-II: CORE COURSE-II: MAJOR PRACTIAL-I (ANY FIFTEEN)		
Course Code : U2RPHCC2P		**Max. Marks : 100**
Hours/Week : 3		**Internal Marks : 40**
Credit : 5		**External Marks : 60**

1. Non-uniform bending – Pin and Micrscope.
2. Uniform bending – Optic lever.
3. Surface tension – Capillary rise.
4. Sonometer – Verification of laws and determination of frequency
5. Melde's Experiment – Transverse and longitudinal.
6. Compound pendulum – g and k.
7. Cantilever depression – scale and telescope.
8. Specific heat capacity of a liquid – Newton's law of cooling.
9. Thermal conductivity of a bad conductor – Lee's disc.
10. Long focus convex lens – f, R, µ.
11. Concave lens – „f'
12. Newton's Rings – 'R' determination, µ of liquid.
13. Spectrometer – µ of solid prism.
14. Air wedge – thickness of insulation.
15. P.O.Box – Temperature coefficient.
16. Meter Bridge – Specific Resistance

SEMESTER-II: CORE COURSE-III: MECHANICS AND RELATIVITY		
Course Code : U2RPHCC3		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To have a knowledge in the field of dynamics.
- To understand the concepts of centre of gravity, centre of pressure.
- To understand the concepts of hydrodynamics.
- To learn the principles of Classical Mechanics

UNIT-I: DYNAMICS PROJECTILE, IMPULSE, IMPACT

Projectile − motion of a particle projected horizontally from a point above the earth − particle projected in any irection − path of a projectile is a parabola − range of horizontal and inclined plane − impulse − impact − impulsive force − laws of impact − impact of a smooth sphere on a horizontal plane − direct and oblique impact − loss in kinetic energy due to direct and oblique impact − motion of two interacting bodies − reduced mass.

UNIT-II: DYNAMICS OF RIGID BODIES

Kinetic energy of rotation − angular momentum of a rotating body − relation between the torque and angular acceleration − theory of compound pendulum − equivalent simple pendulum − reversibility of centers of oscillation and suspension − Kater's pendulum − determination of g and radius of gyration of a bar pendulum − centers of mass − velocity and acceleration of centre of mass − equation for a rocket − conversion of linear and angular momentum.

UNIT-III: CENTRE OF GRAVITY AND STATES OF EQUILIBRIUM

Universal law of gravitation − gravitational potential and field due to spherical shell and solid sphere − gravitational energy − Gauss's and Poisson's equations − Boy's method of determination of G − centre of gravity of and arc of a circle and sector of a circle − centre of gravity of solid and hollow hemisphere − solid and hole tetrahedron − stability of equilibrium.

UNIT-IV: CENTRE OF PRESSURE AND HYDRODYNAMICS

Vertical rectangular lamind − vertical triangular lamind − vertical circular lamind − effect on the centre of pressure of further immersion on a lamind − Fortin's and faxlty barometer − correction for a barometer reading − atmospheric pressure its variation of continuity of flow − Euler's equation for unidirectional flow − Torricelli's theorem − Bernoulli's theorem and application

UNIT-V: RELATIVITY

Galilean – Newtonian relativity, Galilean transformations – Michelson Morley experiment and its importance – Leuristein‟s postulates – Lorentz transformations and its interpretation – consequence of Lorentz transformation – Length contractor, time dilation – relativistic addition of velocities – Mass energy equivalence – Basic ideas of general theory of relativity.

BOOKS FOR STUDY:

1. Mechanics – Part – I & II Narayanamoorthy.
2. Classical Mechanics – H. Goldstein
3. Statistical Mechanics – Sathyaprakash & C. Agarwal.

BOOKS FOR REFERENCE:

1. Elementary statistical mechanics – Gupta Kumar
2. Mechanics – D.S. Mathur
3. Classical mechanics – Gupta Kumar and Sharma.

SEMESTER-III: CORE COURSE-IV: THERMAL PHYSICS AND STATISTICS		
Course Code : U3RPHCC4		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To study about the nature of Heat
- To learn the concepts of thermodynamics
- To study the basic concepts of statistical Physics

UNIT-I: THERMODYNAMICS

Zeroth law of thermodynamics – First law of thermodynamics – Heat engines – Reversible and irreversible process of Carnot's theorem – Second law of thermodynamics, Thermodynamic scale of temperature – Entropy – Change of entropy in reversible and irreversible processes – Temperature – entropy diagram (T.S) – Law of increase of entropy – Maxwell thermo dynamical relations – Clausius's – Claypeyron's latent heat equations.

UNIT-II: LOW TEMPERATURE

Joule – Thomson's effect – Porous plug experiment – Liquefaction of gases – Linde's method – Adiabatic demagnetization – Liquefaction of He – Practical applications of low temperature – Refrigerating mechanism – Air conditioning machines.

UNIT-III: RADIATION

Radiation – Stefan's law Deduction of Newton's law from Stefan's law – Boltzmann's law – Black body radiation – Wein's law – Rayleigh – Jean's law – Planck's law – Angstrom Pyroheliometer – Solar constant – Surface temperature of sun Sources of solar energy –Some everyday applications.

UNIT-IV: SPECIFIC HEAT

Specific heat of solids – Einstein's theory of specific heat – Debye's theory –Specific heat of gases – Mayer's Relation – Quantization of various contributions to energy of diatomic molecules – Specific heat of diatomic gases – (Quantum Theory)

UNIT-V: STATISTICAL PHYSICS

Phase space – Statistical Equilibrium – Microstates and Microstates – Maxwell – Boltzmann statistics – Application of M.B statistics to molecular energies in an ideal gas – B-E statistics- Application of B-E statistics to photon gases – F-D statistics – Application of F.D statistics to electron gas – Comparison of three statistics.

BOOKS FOR STUDY:

1. Brijlal, and Subramaniyam, Heat and Thermodynamics, S. Chand & Co. (2007)
2. J.B.Rajam and C.L Arora, Heat and Thermodynamics.

SEMESTER-III: CORE COURSE-V: ELECTRICITY,MAGNETISM AND ELECTROMAGNETISM		
Course Code : U3RPHCC5		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To study the static characteristics of electric charges
- To understand the concepts of electromagnetic effect.
- To study basic concepts of AC circuits.
- To understand the concepts magnetic properties of materials

UNIT-I: ELECTROSTATICS

Coulomb's 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: CURRENT ELECTRICITY

Ampere's circuital law and its applications – Field along the axis of a circular coil and Solenoid – Force on a conductor in a magnetic field – Theory of Ballistic Galvanometer – Figure of merit – Damping Correction – Wheatstone network – Carey Foster's Bridge – Potentiometer - Measurement of current, resistance and low voltage.

Unit-III: ELECTROMAGNETIC INDUCTION

Laws of electromagnetic induction – Self and mutual induction – Self inductance of a solenoid – Mutual inductance of a pair of solenoids – Coefficient of coupling – Experimental determination of self and mutual inductance (Rayleigh's method) Growth decay of current in circuit containing Land R – Growth and decay of charge in circuit containing C and R – High resistance by leakage – Charging and discharging of capacitor through Land R.

Unit IV: AC CIRCUITS

Alternating EMF – Alternating EMF applied to circuits containing L and R – C and R – Alternating EMF applied to circuits containing L, C and R – Series and Parallel resonance circuits – Sharpness of resonance – Q factor – Power in AC circuits – Power factor – Wattless current

Unit-V: MAGNETISM

Intensity of magnetization – Susceptibility – Types of magnetic materials – Properties para, dia and ferro magnetic materials – Cycle of magnetization – Hysteresis – B-H curve – application of BH curve– Magnetic energy per unit volume.

BOOKS FOR STUDY:

1. Brijlal and Subramaniyam – Electricity and Magnetism – S.Chand & Co.
2. R. Murugesan, Electricity and Magnetism, S.Chand & Co.

BOOKS FOR REFERENCE:

1. Narayanamoorthy and Nagaratnam, Electricity and Magnetism NPC, Chennai.

SEMESTER-VI: CORE COURSE-V: MAJOR PRACTICAL – II (ANY FIFTEEN)		
Course Code : U4RPHCC6P		**Max. Marks : 100**
Hours/Week : 3		**Internal Marks : 40**
Credit : 5		**External Marks : 60**

1. Static Torsion – Determination of n
2. Torsional pendulum – n and I
3. Coefficient of viscosity of highly viscous liquid
4. Stoke's method – Viscosity of highly viscous liquid
5. Characteristics of junction and Zener diodes
6. Emissive power of a surface – Spherical calorimeter
7. Joule's calorimeter – Specific heat capacity of liquid (Barton's correction)
8. Carey Foster's Bridge – R and p
9. Potentiometer – Ammeter calibration
10. Potentiometer – Temperature coefficient of R
11. Potentiometer – Calibration of low range voltmenter
12. Figure of merit – Mirror Galvanometer
13. Transistor Characteristics – CE – configuration
14. Spectrometer - μ of a liquid
15. Spectrometer – I-d curve
16. CRO – Study of wave forms – Lissajous figures – f determination
17. Construction of Full wave rectifier
18. Construction of a temperature controller using Pt 100 senor

SEMESTER-IV: CORE COURSE-VII: ANALOG ELECTRONICS		
Course Code : U4RPHCC7		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To learn about the characteristics of semiconductor devices under forward and reverse biasing
- To study about the functions and different types of amplifiers and oscillators.
- To understand the basic concepts of operational amplifier and special diodes.

UNIT-I: SEMICONDUCTORS AND DIODES

Intrinsic and extrinsic semi conductor – PN junction diode – Biasing of PN junction – VI Characteristics of diode – Rectifiers – Half wave – full wave and bridge rectifiers – Break down mechanisms – Zener diode characteristics of Zener diode – Zener diode as voltage regulator.

UNIT-II: BIPOLAR TRANSISTORS

Bipolar junction transistor – Basic configurations Relation between α and β – Characteristic curves of transistor – CB,CE mode – DC load line – DC bias and stabilization – fixed bias – voltage divider bias – Transistor as an amplifier – Transistor as a two port network – h Parameters.

UNIT-III: AMPLIFIERS AND OSCILLATORS

Single stage CE amplifier – Analysis of hybrid equivalent circuit – Power amplifiers – Efficiency of class B Power amplifier – Push-pull amplifier – General theory of feedback – Properties of negative feedback – Criterion for oscillations – Hartley oscillator – Colpitt's oscillator – Wien bridge's oscillator.

UNIT-IV: SPECIAL SEMICONDUCTOR DEVICES

FET – JFET – MOSFET – FET parameters – Comparison between FET and BJT – Photo transistor – LED – photodiode – SCR – DIAC – TRIAC – UJT – UJT as relaxation oscillator.

UNIT-V: OPERATIONAL AMPLIFIERS

Differential amplifier – Common mode rejection ratio – ideal operational amplifier – Virtual ground – Inverting amplifier – Non inverting amplifier – Common mode rejection ration – Applications. – Adder – substractor – Differentiator – Integrator – Sign changer – scale changer.

BOOKS FOR STUDY:

1. Mehta V.K., Principles of Electronics, S.Chand and company Ltd.
2. Chattopadhyay, D., Raxshit, P.C., Sara, B. and Purkait, New Age International (P) Ltd.

BOOKS FOR REFERENCE:

1. Theraja. B. L., Basic electronics solid state, S. Chand and Company Ltd (2002).
2. Sedha R.S., A text book of applied Electronics, S. Chand & company Ltd (2002).

SEMESTER-V: CORE COURSE-VIII: OPTICS AND SPECTROSCOPY		
Course Code : U5RPHCC8		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To study about the principles of geometrical and physical optics
- To understand the interference, diffraction and polarisation of light
- To understand basic principles of spectroscopy

UNIT-I: GEOMETRICAL OPTICS

Spherical aberration – Spherical aberration of a thin lens – Ray tracing - Methods of reducing spherical aberration – Coma – Aplanatic surface – Astigmatism – Curvature of the field – Meniscus lens - Distortion – Ramsden‟s eyepiece – Huygen‟s eyepiece.

UNIT-II: INTERFERENCE

Introduction – Thin film – Air wedge – Newton's rings – Haidinger's fringes – Brewster's fringes – Michelson Interferometer and its applications – Fabry perot's Interferometer – Interference filter – Stationary waves in light – Colour photography (ideas only) – Holography – Construction and reconstruction of a hologram – Applications.

UNIT-III: DIFFRACTION

Fresnel's diffraction – Diffraction at a (1) circular aperture (2) Straight edge (3) narrow wire. – Fraunhoffer's diffraction at a single slit – Double slit – Missing orders in a Double slit, Diffraction pattern – Grating with theory – Oblique incidence – Overlapping of spectral lines – prism and grating spectra – Theory of concave reflection grating – Resolving power of a grating – Dispersive power of a grating.

UNIT-IV: POLARIZATION.

Polarization of transverse waves – Nicol prism – Nicol prism as an analyzer and polarizer – Huygens‟s explanation of Double refraction in uniaxial crystals – Double Image polarizing prisms – Elliptically and circularly polarized light – Production and detection – Quarter wave and half wave plate – Babinet's compensator – Optical activity – Fresnel's explanation of optical activity – Laurent's Half shade polarimeter.

UNIT-V: SPECTROSCOPY

Types of spectra – Emission and absorption spectra – Continuous, band and line spectra – Solar spectrum – Fraunhoffer lines – Raman effect – Explanation of Raman effect using simple quantum theory – Experiment – Applications – IR spectroscopy – UV spectroscopy – Sources – Detection – Properties and applications.

BOOKS FOR STUDY:

1. Text Book of Optics by Brijlal and Subramaniam and avadhanulu. M.N, S. Chand and Company Ltd (2007).

2. Optics by Khanna and Gulati.

BOOKS FOR REFERENCE:

1. Optics – Jenkings and White, McGraw Hill.
2. Optics – Ajoy Chatak (TMH).

SEMESTER-V: CORE COURSE-IX: ATOMIC AND NUCLEAR PHYSICS		
Course Code : U5RPHCC9		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To study about the properties of positive rays, negative rays, photo electric effect and atom model.
- To study about Fine Structure of Spectral Lines and X-rays.
- To understand the basic concepts of nuclear properties and nuclear reactors

UNIT-I: CATHODE RAYS AND POSITIVE RAYS.

Cathode rays – properties – e/m of cathode rays – Milliken's oil drop method – Positive rays – Properties – e/m of Positive rays: Thomson's parabola method – Aston's Bain's bridge - Determination of critical Potential – Franck and Hertz's experiment - Davisrs and Goucher method.

UNIT-II: VECTOR ATOM MODEL

Various quantum numbers, L-S and j-j Couplings – Pauli's exclusion principle – electronic configuration of elements and periodic classification – magnetic dipole moment of electron due to orbital and spin motion – Bohr magnetron – stern and Gerlach experiment – Stark effect.

UNIT-III: FINE STRUCTURE OF SPECTRAL LINES

Special terms and notations – selection rules- intensity rule and internal rule – Fine structure of sodium D lines – Alkali spectra – Fine structure in Alkali spectra – spectrum of Helium – Zeeman effect – Larmor's theorem – Debye's quantum mechanical explanation of the normal Zeeman effect – Anamolous Zeeman effect – theoretical explanation, Lande's 'g' factor and explanation of splitting of D1 and D2 lines of sodium.

UNIT-IV: NUCLEUS I

Review of basic properties of nuclei – mass, radius, binding energy, and nuclear moments – isotopes – isobars – radioactivity cyclotron – Betatron – Geiger Muller counter – cloud chamber – Q value of nuclear reaction – discovery of neutron, positron.

UNIT-V: NUCLEUS II

Liquid Drop Model – application to fission, fission fragments, neutrons in fission process – nuclear energy – thermo nuclear reactions – atom bomb. Shell Model – magic numbers – spin orbit coupling – Basic ideas of a nuclear reactor. Bethe's theory of fusion – Solar energy – hydrogen bomb. Basic classification of subatomic particles – photons, leptons – meson – baryons.

BOOKS FOR STUDY:

1. Murughesan, R., Modern Physics S.Chand & Co.,(2006).

BOOKS FOR REFERENCE:

1. Arthus Beiser, Concept of Modern Physics: Mc Graw Hill Ed. V (1999).

SEMESTER-V: CORE COURSE-X: DIGITAL ELECTRONICS		
Course Code : U5RPHCC10		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To understand the number systems and logic gates.
- To simplification of Boolean algebra.
- To study the sequential and combinational circuits digital.
- To learn basic concepts of memories.

UNIT-I: NUMBER SYSTEMS AND LOGIC GATES

Introduction to decimal, binary, octal, hexadecimal number systems – Interconversions – One‟s and two‟s complements – Simple binary arithmetic operations – Addition, subtraction and multiplication – Binary subtraction using one‟s and two‟s complements – Positive and negative logic – Basic and derived logic gates, symbols and their truth tables – AND, OR, NOT, NAND, NOR, XOR, and XNOR – Universality of NAND and NOR gates.

UNIT-II: BOOLEAN ALGEBRA AND SIMPLIFICATION OF LOGIC EXPRESSIONS

Boolean algebra – Basic laws of Boolean algebra – De-Morgan‟s theorems Reducing Boolean expressions using Boolean laws – SOP and POS forms of expressions miniterms and maxterms – Karnaugh map simplification (2, 3 variables only).

UNIT-III: COMBINATIONAL DIGITAL SYSTEMS

Half and full adders – Binary address – Half and full subtractors – Binary subtractor Two‟s complement adder / subractor circuits – Decoder & Encoder (basic ideas only) – Multiplexer (4:1) – Demultiplexer (1:4) – A/D conversion – Successive approximation method – D/A conversion – R-2R ladder network.

UNIT-IV: SEQUENTIAL DIGITAL SYSTEMS

Flip flop – RS – clocked RS – T and D flip flops – JK and master slave flip flops – Counters – Four bit asynchronous ripple counter – Ring counter – Synchronous counter – Decade counter – Shift registers – SISO shift registers (4-bit)

UNIT-V: MEMORIES

Introduction – Semiconductor memories – Memory addressing – ROMs – PROMs and EPROMs – Random access memory – Dynamic random access memory – Programmable logic arrays.

BOOKS FOR STUDY:

1. Digital Principles and Application, A.P. Malvino, D.P.Leach, IV Edition, McGraw Hill, New Delhi, 1986.

2. Electronics devices and circuits. Salivahanan. S, Suresh kumar. N and Vallavaraja. A, Tata Mcgraw Hill Publishing Company Private limited, New Delhi.

BOOKS FOR REFERENCE:

1. Digital Electronics, W.H.Gothmann, Prentice Hall of India, Pvt, New Delhi 1996.
2. Fundamentals of Digital Electronics and Micropocessors, Anokh Singh, A.K.Chhabra, S.Chand & Co, New Delhi, 2003

SEMESTER-VI: CORE COURSE-XI: MAJOR PRACTICAL – III (GENERAL) (ANY FIFTEEN)		
Course Code : U6RPHCC11P		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 40**
Credit : 5		**External Marks : 60**

1. Koenig's method – Uniform bending – Y.
2. Spectrometer i-i' curve.
3. Spectrometer – small angle prism.
4. Spectrometer – Grating – Normal incidence.
5. Spectrometer – Grating minimum deviation and dispersive power.
6. Spectrometer – Cauchy's constants.
7. Spectrometer – Fraunhofer lines.
8. Spectrometer – Hartmann's Formula.
9. Field along the axis of a coil – determination of M.
10. Field along the axis of a coil – determination of H.
11. Potentiometer – EMF of a thermocouple.
12. Potentiometer x of thermistor.
13. Potentiometer - High range voltmeter calibration.
14. Ballistic Galvanometer – Figure of merit.
15. B.G. – Absolute capacity of condenser.
16. B.G. – Absolute L.
17. B.G. – Absolute M.
18. Anderson's bridge – AC self inductance of a coil.
19. Series resonance circuits.
20. Parallel resonance circuits

SEMESTER-VI: CORE COURSE-XII: MAJOR PRACTICAL – IV		
Course Code : U6RPHCC12P		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 40**
Credit : 5		**External Marks : 60**

SECTION : A ELECTRONICS (ANY TWELVE)

1. Tuned collector oscillator.
2. Regulated power supply using Zener, Percentage of regulation.
3. Single stage – RC coupled amplifier – Transistor.
4. Emitter follower amplifier – Frequency response.
5. Hartley oscillator using transistor.
6. Astable multivibrator.
7. Monostable multivibrator.
8. FET Characteristics.
9. FET amplifier.
10. Logic gates – AND, OR and NOT gates using discrete components – Truth table.
11. Universal gates NAND/NOR and basic gates from Universal gates.
12. Adder and Subtractor – Half and Full.
13. BCD to 7 segment decoder – 7 segment LED display.
14. Op – Amp – Adder and Subtractor.
15. Op – Amp – Integrator and Differentiator.
16. Demorgan's theorem and Boolean algebra.
17. Flip Flop using gates.
18. Construction of a signal generator with square, triangular and sinusoidal output.
19. Construction of power amplifier.
20. Dc differential amplifier – Determination of Thermo e.m.f.

SECTION – B – MICROPROCESSOR 8085.(ANY THREE).

21. 8-bit addition and 8-bit subtraction.
22. 8-bit multiplication and Division.
23. Conversion from decimal to hexadecimal system.
24. Conversion from hexadecimal to decimal system.
25. 16-bit addition.

SEMESTER-VI: CORE COURSE-XIII: ELEMENTS OF THEORETICAL PHYSICS		
Course Code : U6RPHCC13		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To understand the particle behavior using Lagrangian and Hamiltonian formulation
- To understand the wave nature and wave properties
- To understudy the basic concepts of photo cells

UNIT-I: LAGRANGIAN FORMALISM

Mechanics for a system of particles − constraints − generalized co-ordinates − transformation equations configuration space − principle of virtual work − D' Alembert's principle − Lagrange's equations for systems containing dissipative forces − applications of Lagrange's equations − Atwood's machine − Lagrangian formulation of conservation theorems.

UNIT-II: HAMILTONIAN FORMALISM

Phase space – Generalized momentum – Cyclic co-ordinates –Conservation theorem for generalized momentum – Conservation theorem for energy – Hamiltonian's function – Hamiltonian's equation – Hamiltonian's equations in different co-ordinates system – harmonic oscillator – compound pendulum.

UNIT-III: DUAL NATURE OF MATTER

De Broglie concept of matter waves – de Broglie wavelength – Wave velocity and group velocity for the de Broglie waves – Experimental study of matter waves – Davison and Germer experiment – G.P. Thomson's experiment for verifying de Broglie relation – Heisenberg's uncertainty Principle – Electron microscope – Gamma ray microscope.

UNIT-IV: SCHRÖDINGER'S WAVE MECHANICS

Basic postulates of wave Mechanics – Development of Schrödinger wave equation – Time independent and dependent forms of equations – Properties of wave function – Orthogonal and normalized wave function Eigen function and Eigen values – Applications of Schrodinger equation – particle in a box- Linear harmonic oscillator – The barrier penetration problem.

UNIT-V: PHOTO ELECTRIC AND COMPTON EFFECTS

Photo electric effect – Lenard, Richardson and Compton experiments – laws of photoelectric emission – Einstein's photoelectric equation – Millikan's experiment- Determination of Planck's constant – photo emissive cell – photo – voltaic cell – photo conductive cell – photo multiplier – Compton effect – Theory – Experimental Verification.

BOOKS FOR STUDY:

1. Murugesan. R.S. Chand & Co. New Delhi. 2003.
2. Classical Mechanics. Guptha, Kumar & Sharma. Pragathi Prakasan, Meerut. 2001.

BOOKS FOR REFERENCE:

1. Classical Mechanics. H. Gold stein. Narosa Publishing House, 2001.
2. Classical Mechanics. Upadyaya.

SEMESTER-VI: CORE COURSE-XIV: MICROPROCESSOR AND ITS APPLICATION		
Course Code : U6RPHCC14		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 5		**External Marks : 75**

OBJECTIVES:

- To study about the microprocessor 8085
- To learn the assembly language programming in 8085
- To know the interfacing techniques with the peripherals

UNIT1: MICROPROCESSOR ARCHITECTURE.

Intel 8085-ALU – timing and control unit-Registers-Data and address buses – Pin configuration – opcode and operands – Instruction and data formats – Addressing modes

UNIT-II: INSTRUCTION SET FOR 8085.

Intel 8085 instructions – Instruction cycle –fetch operation; execute operation-machine cycle and state-instruction and dataflow-timing diagram-timing diagram for op-code fetch cycle memory read-I/O read - memory write - I/O write.

UNITIII: ASSEMBLY LANGUAGE PROGRAMMING

8-bit addition – 8 - bit subtraction – 8-bit multiplications – 8-bit division – sum of series – Data transfer – addition of multibyte numbers – smallest numbers in an array– largest numbers in an array – arrays in ascending order – array in descending orders – square root of a numbers

UNITIV: PERIPHERAL DEVICES AND THEIR INTERFACING

Address space partitioning-memory and I/O interfacing-data transfer schemes - I/O ports-interrupts of Intel 8085 - Programmable peripheral interface 8255 - DMA controller 8257 - programmable timer/Counter8253 - interfacing of A/D converter - DAC 0800.

UNITV: MICROPROCESSOR APPLICATIONS

Delay subroutine -7 segment LED display - measurement of frequency - water level indicator-interfacing of stepper motor - microprocessor based traffic control - to generate a square wave or pulse using I/O port.

BOOKS FOR STUDY:

1. Fundamentals of microcomputer and microprocessor. Ram. B (IV edition, 1995)
2. Introduction to microprocessor. Mathur. A.P

BOOKS FOR REFERENCE

1. Microprocessor organization and architecture. Laventhal.L.A. Prentice hall india.

SEM – V MAJOR BASED EELCTIVE COURSE – I MATERIALS SCIENCE		
Course Code : U5RPHMBE1		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 4		**External Marks : 75**

OBJECTIVES:

- To understand the chemical bonds and the properties of materials.
- To understand the non destructive testing
- To acquire knowledge in behavior of various materials

UNIT I: CHEMICAL BONDS

Review of Atomic structure – Inter-atomic Forces – Different types of chemical bonds – Ionic covalent bond or homopolar bond – Metallic bond – Dispersion bond – Dipole bond – Hydrogen bond – Binding energy of a crystal – Elastic properties.

UNIT II: MODERN ENGINEERING MATERIALS

Polymers –Rubbers – Plastics – Woods – Ceramics – Super strong materials – Cermets – High temperature materials – Thermo electric materials – Electrets – Nuclear engineering materials – expand – Fuel materials – moderator materials – Fuel cladding materials – Control materials.

UNIT III: NON DESTRUCTIVE TESTING

Radiographic methods – Photo elastic method - Magnetic methods – Electrical methods – Ultrasonic methods – Visual and other optical methods – Thermal methods – Surface defect detection by NDT – Equipments used in non destructive testing – Metallurgical microscope – Election microscope – Coolidge x-ray tube – Production of ultrasonic waves – Magnetostriction Ultrasonic generator - Pilzo electric ultrasonic generator.

UNIT IV: NEW MATERIALS

Metallic glasses – Fibre reinforced plastics – Metal matrix composites –Material for optical sources and detectors – Fiber optic materials and their applications – Display materials – Acoustic materials and their applications – SAW materials – Biomaterials – High temperature superconductors.

UNIT V MECHANICAL BEHAVIOR OF MATERIALS

Different mechanical properties of Engineering materials – Creep – Fracture – Technological properties – Factors affecting mechanical properties of a material – Heat treatment - cold and hot working – Types of mechanical tests – metal forming process – Powder – misaligning – Deformation of metals – Bauschinger effect – Elastic after effect – Deformation of crystals and poly crystalline materials.

BOOKS FOR STUDY:

1. Materials Science by M.Arumugam, Anuradha Publishers. 1990 Vidayalkaruppur, Kumbakonam.

BOOKS FOR REFERENCES:

2. Materials Science and Engineering V.Raghavan Printice Hall India Ed. V 2004. New Delhi.

SEM – VI MAJOR BASED EELCTIVE COURSE – II COMPUTER PROGRAMMING – C LANGUAGE		
Course Code : U6RPHMBE2		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 4		**External Marks : 75**

OBJECTIVES:

- To understand the basic concepts of C structure.
- To learn the keywords and functions of C
- To practice the programming exercises

UNIT I

Introduction: Importance of C – Basic structure of C Programs – Programming Style. Constants, Variables and Data Types: Character set, Keywords and Identifiers – Constants – Variables – Data Types – Declarations of Variables – Assigning Values of variables.

Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Comma Operators – Arithmetic expressions – Procedure and Associativity.

UNIT II

Input Output Operator: getchar, putchar, Formatted output (printf) and Formatted input (scanf). Control Structure: Decision making with if, - if. Else – switch – go to – The break and continue statements – while – do, while – for statements.

Arrays. One – dimensional and two dimensional arrays, declaring arrays, storing arrays in memory – initializing arrays.

UNIT III

Functions: Basic functions – Return values and their types – calling functions – function arguments – external variables and scope rules.Structures and Union: Structures – Arrays of Structures – Arrays within structures – structures and functions – Unions.

UNIT IV

Pointers: Pointers and functions – arguments – Pointers and arrays – address arithmetic – character points and functions – Pointer arrays – Point arrays – Point on Pointers.– opening and closing a file – reading and writing data – error handling – Random Access and sequential access

UNIT V

Development of algorithm, flow chart and program for the following problem.

1. Average of a set of numbers.
2. Conversion of Fahrenheit to Celsius.
3. Solving quadratic equation.
4. Finding the factorial using recursion.
5. To add/subtract/multiply two matrices.
6. To find the smallest and largest element in an array.
7. Sorting a set of numbers in ascending/ descending order.
8. To arrange the names in alphabetical order.

BOOKS FOR STUDY

1. Programming in ANSI – C – E.Balagurusamy – Tata McGraw Hill.
2. Programming with C – Venugopal, K.R.and Sudep R.P.Tata McGraw Hill, 1998.

BOOKS FOR REFERENCES:

1. Schaum‟s Outline Series Theory and Problems of Programming with C – Byron S.Gottifried, McGraw Hill, Internationals.

SEM – VI MAJOR BASED EELCTIVE COURSE – III NANO-SCIENCE		
Course Code : U6RPHMBE3		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 4		**External Marks : 75**

OBJECTIVES:

- To acquire knowledge about the Properties and structure of nano materials
- To study about fabrications and characterization of nano materials
- To learn the evaluation techniques of nano materials through microscopy

UNIT-I: NANO TECHNOLOGY

Nanomaterials - basis of nanomaterials - Nanotechnology - four generations of Nano-technology - thermal, optical, electrical and magnetic properties of nanomaterials- Elementary ideas of Nano structures.

UNIT-II: METHODS OF NANO MATERIALS

Classification of Nano materials - technique of preparation - bottom up methodology (Sol-Gel preparation technique) - Top down methodology - fullerenes - Properties of fullerenes.

UNIT-III: CARBON NANO TUBES

Types of carbon Nanotubes -single walled (SWNT) Nanotubes - multi walled (MWNT) Nanotubes - properties - kinetic property - electrical property - Chemical, mechanical applications – current applications.

UNIT-IV: QUANTUM DOTS, WIRE AND WELL

Quantum dot – fabrication –optical properties – quantum dot for tumor targeting –quantum wire–quantum well – fabrication –applications

UNIT-V: EVALUATION TECHNIQUES

Scanning Probe Microscope - Types - Tunnelling Electron Microscope (TEM) - Atomic Force Microscopy (AFM) - Scanning Tunneling Microscopy (STM).

BOOKS FOR STUDY:

1. S. Shanmugam, Nano Technology, MJP Publishers, Second edition, 2010.

BOOKS FOR REFERENCES:

1. KK. Chattobpadhyay, Introduction to Nano Science and Technology, PHI, New Delhi, 2011

MAJOR BASED EELCTIVE COURSE – IV ENERGY PHYSICS		
Course Code :		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 4		**External Marks : 75**

OBJECTIVES:

- To understand the concepts of conventional and non conventional energies
- To understand the availability and practical usage of solar energy in various forms and other alternative energy sources.
- To study the Biomass energy fundamentals.

UNIT I: CONVENTIONAL ENERGY SOURCES

World‟s reserve - commercial energy sources and their availability – various forms of energy – renewable and conventional energy system – comparison – Coal, oil and natural gas – applications – Merits and Demerits

UNIT II: SOLAR ENERGY

Renewable energy sources – solar energy – nature and solar radiation – components – solar heaters – crop dryers – solar cookers – water desalination (block diagram) Photovoltaic generation – merits and demerits

UNIT III: BIOMASS ENERGY FUNDAMENTALS:

Biomass energy – classification – photosynthesis – Biomass conversion process

UNIT IV: BIOMASS UTILIZATION

Gobar gas plants – wood gasification – advantages & disadvantages of biomass as energy source

UNIT V: OTHER FORMS OF ENERGY SOURCES

Geothermal energy – wind energy – Ocean thermal energy conversion – energy from waves and tides (basic ideas)

BOOKS FOR STUDY:

1. Renewable energy sources and emerging Technologies, by D.P. Kothari, K.C. Singal & Rakesh Ranjan, Prentice Hall of India pvt. Ltd., New Delhi (2008)

BOOKS FOR REFERENCE:

1. Renewable Energy sources and their environmental impact – S.A. Abbasi and Nasema Abbasi PHI Learning Pvt. Ltd., New Delhi (2008)

MAJOR BASED EELCTIVE COURSE – V COMMUNICATION SYSTEMS		
Course Code :		**Max. Marks : 100**
Hours/Week : 5		**Internal Marks : 25**
Credit : 4		**External Marks : 75**

OBJECTIVES

- To learn the radio and television transmission systems.
- To learn the switched communication systems.
- To learn the radar and fibre optic communication systems.

UNIT I: RADIO TRANSMISSION SYSTEMS

Introduction - AM transmitters - FM transmitters - Tuned RF receivers - Superhet receiver - AM broadcast receivers - RF amplifier - FM receiver - Measurement of receiver performance - sensitivity, selectivity, adjacent channel selectivity - signal to noise ratio.

UNIT II: TELEVISION SYSTEMS

Television basics - TV camera systems -CCD Camera- Television transmitters- Monochrome TV receiver - Principle of a colour TV - PAL colour receiver - Television screens - CRT and LCD.

UNIT III: SWITCHED COMMUNICATION SYSTEMS

Basic system structure - Telephony - Telephone transmitter - Telephone receiver - Basic telephone set - Wireless communication systems - GPRS - Bluetooth - Cell phone.

UNIT IV: RADAR AND NAVIGATION SYSTEMS

Basic Radar system – Radar equation – Pulsed Radar system - Moving Target Indicator (MTI) - CW Doppler Radar - Frequency Modulated CW radar - Radio Navigational aids - Radio Direction Finding

UNIT V: FIBRE OPTIC COMMUNICATION SYSTEMS

Total internal reflection and basics of fibre optic system - Optical fibres - Types of optical fibres - Optical propagation theory (based on ray optics)- Fibre Attenuation - Fibre selection - Fibre materials Fibre fabrication – Cabling - Fibre connectors - Applications - Internet, Information superhighway, medicine - Fibre Optic Transmitters and receiver (Block diagram only).

BOOKS FOR STUDY:

1. ANOKH SINGH, Principles of Communication Engineering,S. Chand and Company Ltd.I Edition, Reprint 2001.

BOOKS FOR REFERENCE:

1. JK FRANZ & VK JAIN, Optical Communications - Components and Systems, Narosa Publishing House Pvt. Ltd.I Edition, Reprint 2005.

SEM – IV: SKILL BASED EELCTIVE COURSE – I LASER PHYSICS		
Course Code : U4RPHSBE1		**Max. Marks : 100**
Hours/Week : 4		**Internal Marks : 25**
Credit : 2		**External Marks : 75**

OBJECTIVES

- To understand the principles of laser
- To understand the production of Laser
- To understand the working of laser in various field

UNIT I: FUNDAMENTALS OF LASER

Spontaneous emission – stimulated emission – meta stable state – Population inversion – pumping – Laser Characteristics

UNIT II: PRODUCTION OF LASER

Helium – Neon Laser – Ruby Laser – CO2 Laser – Semiconductor Laser

UNIT III: INDUSTRIAL APPLICATIONS OF LASER

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

UNIT IV: LASERS IN MEDICINE:

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

UNIT V: LASERS IN COMMUNICATION

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

BOOK FOR STUDY:

1. An introduction to LASERS – N. Avadhanulu, S. Chand & Company (2001)

BOOKS FOR REFERENCE:

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

SEM – V: SKILL BASED EELCTIVE COURSE – II PHOTOGRAPHY		
Course Code : U5RPHSBE2		**Max. Marks : 100**
Hours/Week : 2		**Internal Marks : 25**
Credit : 2		**External Marks : 75**

OBJECTIVES

- To acquire knowledge about parts and types of camera, sizes and types of films used.
- To get trained in taking still photograph, developing and printing.
- To understand the basic principles of enlarging and colour photography.
- To acquire knowledge about digital photography.

UNIT I: CAMERA

Basic parts of the camera, three important controls of the camera, types of camera-Box camera, simple miniature camera, Modern reflex camera-TLR and SLR cameras

UNIT II: FILMS-SIZES AND TYPES

Black and White films, types of film, Film sizes and negatives, interchangeable lenses.

UNIT III: EXPOSURE AND PICTORIAL COMPOSITION

Exposure for photographing in artificial light, depth of field, depth of focus, exposure for taking photographs of moving subjects -shutter speed for moving objects-panning-practical hints for exposing.

UNIT IV: DEVELOPING THE FILM

Basic principle in film developing-dish developing- tank developing-time and temperature control of developing.

UNITV: PRINTING, ENLARGING, COLOUR AND DIGITAL PHOTOGRAPHY

Contact printing-enlarging, techniques and practical hints on enlarging - primary and complementary colour - colour films-camera for colour photography - digital photography - choosing a digital camera - digital manipulation.

BOOK FOR STUDY:

1. O.P. Sharma, Practical photography.
2. Lee Forst - Hodder & Stoughton, Teach yourself Photography, U.K.

BOOK FOR REFERENCE:

1. Robert L. Kerns, "Photo journalism", PRENTICE Hall Inc, Engle wood Chiffs, N.J. 1990.
2. Julian Calder, John C Carrett, " The 35 mm Photographer's hand book", Marshall edition London, 1999.

SEM – VI: SKILL BASED EELCTIVE COURSE – III PHYSICS OF HOME APPLIANCES		
Course Code : U5RPHSBE2		**Max. Marks : 100**
Hours/Week : 2		**Internal Marks : 25**
Credit : 2		**External Marks : 75**

OBJECTIVES:

- To understand the basic concepts of home appliances
- To learn the Physical principles and working mechanism of Home appliances
- To study the electrical circuit, Fault finding and Precautions

UNIT – I: ELECTRICAL IRON HOURS

Electric Iron: Common Electric press – Parts of a Common Electric Press - Testing and Fault Finding of an Electric Press - Automatic press – Circuit Diagram-Thermostat-Working of a Thermostat-Steam press.

UNIT – II: ELECTRIC STOVE AND ELECTRIC KETTLE HOURS

Electrical Stove-Description-Heater Element-Ratings (Wire size, length, resistance, current, wattage etc) of a Heater Element -Electric Kettle-Heater Elements of an Electric kettle- Fault Finding and Precautions.

UNIT – III: ELECTRICAL MIXER HOURS

Electric Mixer: Parts of an electrical mixer – Attachments – Blender – Grinder – Juicer – Citrus press – Blades for Citrus press.

UNIT – IV WATER IMMERSION HEATER AND ELECTRIC GEYSER

Water Immersion Heater –Common Faults and Precautions - Electric Geyser: Types – Non pressure type – Pressure type – Fault Finding and Precautions.

UNIT – V: WASHING MACHINES HOURS

Washing machine: Types of washing machines – Conventional – Semi automatic – Automatic – Precaution and fault findings.

BOOK FOR STUDY:

1. S.K. Guptha, Service Manual-Electrical Home Appliances, GT Publications.

SKILL BASED EELCTIVE COURSE – IV CELL PHONE SERVICING		
Course Code :		**Max. Marks : 100**
Hours/Week : 2		**Internal Marks : 25**
Credit : 2		**External Marks : 75**

OBJECTIVES:

- To understand the fundamentals of cell phone
- To learn the chip level study and trouble shooting
- To acquire the practical knowledge.

UNIT I: FUNDAMENTALS OF CELL PHONE

Intr oduction to GSM/CDMA - Concepts of GSM/CDMA Cellular Technologies - Working of GSM - Information of Cell Sites & Base Station - Call Processing of a GSM - GPRS - Mobile Softwares (PC suite)

UNIT II: CHIP LEVEL STUDY

I Chip Level Information of Mobile Phones (Tools & Components) - BGA - SMD - Air Gun - Soldering Station - Rework Station - Soldering lead - Soldering paste - De- Soldering wire - Identification of IC's - Assembling & Disassembling of mobile phones.

UNIT III: TROUBLE SHOOTING

Causes for various problems & Troubleshooting of Problems in a Mobile Phone - Network Problems - Display Problems - Sim Card Problems - Charging problems - Battery Problems - Software Unlocking - Software Flashing - IMEI information - Downloads of logos & Ring tones - Problems related to mobile phone handsets - replacement of Various components ICS.

UNIT IV: PRACTICAL 1

Disassembling the cell phone - Battery problems - display - Antenna problems
- Network problems - Sim Card problems - SMD soldering.

UNIT V: PRACTICAL 2

Software Unlocking - Software flashing - Downloads of logos - Downloads of Ring tones - Hand set problems - Replacement of modules (display, mic, speaker, antenna, amplifier, etc.).

BOOK FOR STUDY

Course material prepared by the department.

SKILL BASED EELCTIVE COURSE – V BIOMEDICAL INSTRUMENTATION		
Course Code :		**Max. Marks : 100**
Hours/Week : 2		**Internal Marks : 25**
Credit : 2		**External Marks : 75**

OBJECTIVES:

- To study the function of various transducers and electrodes in Biomedical instrumentation.
- To understand the working principles of various instruments in Medicine.
- Updating the knowledge in ultrasonic and X-Ray measurements in Medicine.

UNIT - I: BIOELECTRIC POTENTIALS

Resting and action potentials - Propagation of action potentials - Bioelectric potentials: The electrocardiogram (ECG) - The electroencephalogram (EEG) - The Electromyogram (EMG) - Other Bioelectric potentials.

UNIT - II: BIOPOTENTIAL ELECTRODES

Electrode theory - Microelectrodes - Body surface electrodes - Needle electrodes- reference electrodes - pH electrode - Blood gas electrode - Specific ion electrode.

UNIT - III: CARDIOVASCULAR MEASUREMENTS

Electrocardiography - ECG amplifiers - Electrodes & leads - ECG Recorder principles - Measurement of Blood pressure: Indirect measurement - Measurement of Blood flow and cardiac output.

UNIT - IV: NERVOUS MEASUREMENTS

Anatomy - Neuronal communication - Neuronal Receptors - Measurements from the nervous system - Neuronal firing measurements - EMG measurements - Computerized Axial Tomography.

UNIT - V: ULTROSONIC AND X RAY MEASUREMENTS

Basic modes of transmission - Ultrasonic Imaging - Ultrasonic diagnosis - Ultrasonic transducers - Ophthalmic scans - Instrumentation for diagnosis - X rays - Special techniques.

BOOKS FOR STUDY:

1. Bio - Medical Instrumentation. Dr. M. Arumugam. Anuradha agencies Publishers. Vidayal karuppur. Kumbakonam RMS – 612606.

BOOK FOR REFERENCE:

1. Biomedical Instrumentation and measurements by Leslie Cromwell, Fred. J. Weibell, Erich A. Pfeiffer, Prentice Hall India, Second Edition – 1990.

INTER DISCIPLINAR COURSE – I BASIC OF ELECTRONICS		
Course Code :		**Max. Marks : 100**
Hours/Week : 2		**Internal Marks : 25**
Credit : 2		**External Marks : 75**

OBJECTIVES:

- To learn about the DC and AC circuits
- To study about the passive components and semiconductor devices.
- To understand the basic concepts of integrated circuits.

UNIT -I: DC CIRCUITS

Introduction – Ohm's law – Specific resistance of material – Combination of resistance – Kirchoff's laws – Magnetic circuits - Electromagnetic induction

UNIT -II: AC CIRCUITS

Generating of Alternating voltage – Vector representation of alternating quantities – AC series circuits – AC parallel circuits – Resonance circuits – Poly phase systems.

UNIT -III: PASSIVE CIRCUIT COMPONENTS

Resistor – Metal film resistor – Wire wound resistor – Composition resistor- Colour coding – Potentiometer – Precision type potentiometer – Multi turn potentiometer – Capacitor – Electrolytic capacitor – Ceramic capacitor – Mica capacitor – Paper capacitor.

UNIT -IV: SEMICONDUCTOR DEVICES

Basic concepts of P-N diode – Zener diode – Bipolar junction transitor – Junction field effect transistor – MOSFET – Thyristor – Photo devices.

UNIT -V: INTEGRATED CIRCUITS

Fabrication of monolithic integrated circuits – Operational amplifier – Ideal operational amplifier characteristics – Inverting and non inverting amplifiers – Introduction to logic gates (AND, OR, NOT, EXOR, NAND and NOR).

BOOKS FOR STUDY:

1. Basic electrical, electronics and computer engineering. Nagarajan. G Meenakshi publication, 1993.
2. Principles of Electronics. V.K. Mehta and Rohit Mehta. S. Chand & Company Limited, XI Edition (2008).

INTER DISCIPLINAR COURSE – II BASIC OF DIGITAL ELECTRONICS		
Course Code :		**Max. Marks : 100**
Hours/Week : 2		**Internal Marks : 25**
Credit : 2		**External Marks : 75**

OBJECTIVES:

- To understand the number systems and logic gates.
- To simplification of Boolean algebra.
- To study the sequential and combinational circuits digital.
- To learn basic concepts of memories.

UNIT -I: BASICS AND NUMBER SYSTEMS

Digital signals – Basic digital circuits – NAND, NOR, EX-OR – Universality of NAND and NOR gates – Number systems – Interconversion.

UNIT -II: COMBINATIONAL LOGIC DESIGN

Boolean algebra – Demorgan's theorem – Karnaugh map (2-variables) – Don't care condition – Multiplexing – De-multiplexing.

UNIT -III: FLIP FLOPS

RS flip flop – JK flip flop – D flip flop – T flip flop – Master slave flip flop – Applications

UNIT -IV: SHIFT REGISTERS AND COUNTERS

Registers – Left shift – Right shift – Parallel in-Parallel out. Counters – Ripple counter – Twisted ring counter (Jhonson's counter)

UNIT -V: MEMORIES

RAM Static, Dynamic – Diode RAM – PROM – EPROM

BOOKS FOR STUDY:

1. Principles of Digital Electronics. Dr. K. Meena. Prentice Hall india P.V.T. Ltd. New Delhi (2009)

BOOK FOR REFERENCE:

1. Modern Digital Electronics, R.P. Jain. Tata Mcgraw Hill. 1997.
2. Digital Electronics. V.K. Puri. Tata Mcgraw Hill.
3. Computer System Architecture, Moris Mano. Prentice Hall. 1998.

INTER DISCIPLINAR COURSE – III HISTORY OF SCIENCE		
Course Code :		**Max. Marks : 100**
Hours/Week : 2		**Internal Marks : 25**
Credit : 2		**External Marks : 75**

OBJECTIVES:

- To provide a more conventional history, with the emphasis on the character and philosophy of the period, the new ideas or methods that emerged during the period, and the major advances in each branch of science or technology

UNIT – I: SCIENCE IN THE SEVENTEENTH CENTURY

Heat as a fluid – Dr. Black & James Watt – Count Rumford and Heat as motion Benjamin Franklin – Coulomb's law.

UNIT – II: ELECTRICITY MAGNETISM & LIGHT

Mystery of electricity magnetism – Faraday – the great experimenter – Thomas Alva Edition – James Clark Maxwell – Hertz waves – Young, Fresnel and light waves.

UNIT – III: ATOMS & ELEMENTS

Dalton's atoms – Avogadro's Hypothesis – Volta & birth of the battery – Davy's electrochemistry – Mendeleev's periodic table – Joule's measurement.

UNIT – IV: LIFE SCIENCE

Charles Darwin – Voyage of Beagle – Pre Darwinians evolution – Descent of man – the Neanderthal mystery – Pavlov & the Brain – Birth of cell theory – Pasteur's germ theory – Robert coche – finding causes of Disecus.

UNIT – V: MICROBIOLOGY

The Double Helix model of DNA – RNA story – Genetic code – cloning – viruses – Birth of genetic engineering

BOOKS FOR STUDY:

1. Ray Spangenburg and Diane K. Moser, The History of Science from 1946 to the 1990's, Universities Press, 2010.

BOOK FOR REFERENCE:

1. Ray Spangenburg and Diane K. Moser, The History of Science in the Eighteenth Century, The History of Science in the Nineteenth Century, Universities Press, 2009.

SEM – III: ALLIED COURSE – I: ALLIED PHYSICS - I		
Course Code :		**Max. Marks : 100**
Hours/Week : 4		**Internal Marks : 25**
Credit : 3		**External Marks : 75**

OBJECTIVES:

- *To understand the centre of Gravity and stability of floating bodies.*
- *To understand the concepts of acoustics and properties of the sound waves*
- *To learn the basic concepts of osmosis and diffusion*
- *To study the concepts of heat. spectroscopy and fibre optics*

UNIT-I: MECHANICS

Centre of Gravity – Centre of Gravity of a solid hemisphere – hollow hemisphere and Solid Cone. Stability of Floating bodies : Metacentre – Determination of a Metacentric height of a Ship.

UNIT-II: SOUND

Simple Harmonic Motion – Composition of two simple harmonic motion (1) along a straight line and (2) at right angles to each other – Lissa Jou's figures and their applications. Acoustics of buildings Reverberation - Reverberation time – Sabine's formula conditions for good acoustics. Decibel – Phon – Intensity measurement by hotwire microphone method.

UNIT-III: PROPERTIES OF MATER

Diffusion: Ficks's Law – Coefficient of diffusion – Experimental Determination of Coefficient of Diffusion – Application. Osmosis: Laws of osmotic pressure – Berkeley and Hartley Method of determining Osmotic pressure – Elevation of Boiling point and depression of Freezing point – Application.

UNIT-IV: THERMAL PHYSICS

Newton's law of cooling – Verification – Specific Heat Capacity of ahquid by Cooling - Bomb Calorimeter. Conduction : Coefficient of thermal conductivity – Good and bad Conductor Stefan's law of radiation – Solar Constant – Angstrom's Pyroheliometer – Temperature of the Sun.

UNIT-V: OPTICS

Electromagnetic Spectrum – Spectral response of human eye – UV and IR spectroscopy – Raman Effect – Experimental Arrangement – Application of Raman Effect. Fiber Optic communication: Introduction – Optic Fiber – Numerical Aperature – Coherent bundle – Fiber optic communication System and its advantage – multimode fibre optic sensors.

BOOKS FOR STUDY:

1. Statics, Hydrostatics and Hydrodynamics Narayanamoorthy and Nagarathinam.
2. Sound – Saigal – S.Chand & Co. Delhi.
3. Properties of matter – D.S. Mathur.

4. Heat and Thermodynamics – Brijlal and Subramaniam
5. Optics – Brijlal and Subramaniam
6. Optics – Ajoy Ghatak – Tata Mc Graw Hill, Delhi.
7. Allied Physics – I –A.Sundaravelusamy.

SEM – III: ALLIED COURSE – I: ALLIED PHYSICS - I		
Course Code :		**Max. Marks : 100**
Hours/Week : 4		**Internal Marks : 25**
Credit : 3		**External Marks : 75**

ALLIED PHYSICS PRACTICAL
(ANY 15 EXPERIMENTS ONLY).

1. Non uniform bending – Pin and Microscope Method
2. Surface Tension and Interfacial Tension – Drop Weight Method
3. Coefficient of Viscosity of Liquid using graduated burette.
4. Specific heat capacity of liquid by Cooling Method.
5. Lee's Disc – Thermal Conductivity of Bad Conductor.
6. Spectrometer – Grating – Normal incidence method.
7. Spectrometer – Refractive index of Solid Prism (A,D and μ)
8. Newton's Rings – Radius of curvature of a convex lens
9. Sonometer – Verification of Three laws.
10. Carey Foster's Bridge – Specific Resistance.
11. Meter Bridge – Verification of Resistance in Series and Parallel.
12. EMF of thermocouple – Direct Deflection method
13. Characteristics of a junction diode
14. Construction of a full wave rectifier.
15. AND, OR and NOT logic gates – verification of truth table using Discrete components.
16. Meter Bridge – Determination of Specific Resistance.

REFERENCE BOOKS :

1. A textbook of practical Physics – M.N. Srinivasan and others – Sultan Chand & Sons, New Delhi.
2. Practical Physics – A.Dhana Lakshmi and K.R. Paramasivam – Apsara Publication, Trichy.

ALLIED PHYSICS COURSE – III

OBJECTIVES:

- ❖ To study the static characteristics of electric charges
- ❖ To understand the atomic behavior of electric and magnetic field
- ❖ To understand the basic concepts of nuclear physics
- ❖ To understand the electronics and digital electronics

UNIT-I: ELECTROSTATICS

Coulomb's Law – Gauss Theorem, its application Field due to an infinite long plane, Sphere and Cylinder – Mechanical force on the surface of a charged conductor – Electrostatics Energy in the Medium – Formation of Cloud on charged particles. Capacitors – Principles of a Capacitor – Capacity of a capacitor – Capacity of an isolated Sphere and Cylinder – Energy of a charged Capacitor – Sharing of charges and loss of energy.

UNIT-II: ELECTRICITY

Krichoff's Law's and their applications to Wheatstone's network – Condition for bridge balance – Carey Foster's bridge – Variation of resistance with temperature – Laws of electromagnetic Induction – Expression for induced EMF – Self and Mutual Induction – Self Inductance of a Solenoid – Mutual Inductance of a Solenoid Inductor – Co-efficient of coupling – Determination of co-efficient of self inductance by Rayleigh's Method – Eddy Current and its applications.

UNIT-III: ATOMIC PHYSICS

Atom models – Summerfield's and Vector atom Models – Pauli's exclusion Principle – various quantum numbers and quantization of orbits. X-rays – Continuous and Characteristic X-rays – Mosle's Law and its importance – Bragg's Law – Miller indices – Determination of Crystal Structure by Laue's Powder photograph method.

UNIT-IV: NUCLEAR PHYSICS

Nucleus – Nuclear Size – Charge – Mass and Spin – Liquid drop and shell models.
Nuclear Radiations and their properties, particle accelerators – Betatron and
Proton Synchrotron, Particle Detectors – Cloud Chamber and Bubble Chambers.
Four types of reactions – elementary particles and their classifications.

UNIT-V: DIGITAL ELECTRONICS

Number systems − Decimal – Binary – Octal and Hexa Decimal number systems and their Mutual Conversions -1's and2's complement of a Binary number and Binary arithmetic (Addition, Subtraction, Multiplication and Division) – Binary Subraction by 1's and 2's complement methods – Basic logic gates – AND, OR, NOT, NOR, NAND and EXOR Gates – NAND and NOR as universal building gates – Boolean Algebra – Laws of Boolean Algebra – DE Morgan's Theorems – Their verifications using truth tables.

BOOKS FOR STUDY:

1. Magnetism and Electricity – Khare and Srivastava – Atma Ram and Sons – New Delhi.
2. Modern Physics – Murughesan – S.Chand and Co.
3. Digital Principles and their applications – Malvino and Leach – Tata McGraw Hill.
4. Hand Book of Electronics – Gupta and Kumar – Pragati Prakasan.
5. Allied Physics – II – A.Sundaravelusamy.

APPLIED PHYSICS – ALLIED COURSE I

OBJECTIVES:

- To study the static characteristics of electric charges,
- To understand the concepts of capacitors and applications.
- To understand the electromagnetic effect
- To understand the AC circuits and magnetic properties of materials

UNIT-I: ELECTROSTATICS

Fundamentals of electrostatics – Gauss theorem and its application – Intensity due to a charged sphere – intensive at a point between two charged parallel plane conductors – Intensity at a point due to uniformly charged cylinder – Action of points – Electrostatic potential – Equipotential surface – capacity – Principles of a capacitor – Spherical and cylindrical capacitors – Capacitors in serried and a parallel – energy of a charged capacitor – Energy loss due to sharing of charges – Types of capacitors.

UNIT-II: MAGNETOSTATICS

Magnetic field – Magnetic flux density – Magnetization – Intensity of magnetization – Permeability – Susceptibility – Relation between them – Magnetic potential – Potential due to a dipole – Relation between potential and intensity – Magnetic shell and its potential at any point – Properties of dia, para and ferro magnetic materials – Hysteresis – Magneto mater method – Finding coercivity, retentivity and energy loss from hysteresis loop (B-H Curve)

UNIT-III: CURRENT ELECTRICITY

Laplace's law – Intensity at a point due to a straight conductor carrying current – circular coil –Solenoid – Field due to a point on their axis when a current flows – Force between two parallel conductors – standard unit of current – Definition of Ampere – Units of voltage and resistance – Ohm's law – Kirchoff's law – Application to Wheatstone's bridge – Carey Foster's bridge – Potentiometer – Measurement of current and resistance – Calibration of low and high range voltmeters – Fleming's left hand rule

UNIT-IV: ELECTROMAGNETIC INDUCTION

Laws of electromagnetic induction – self and mutual induction – self inductance of solenoid- mutual inductance of pairs of solenoid- coefficient of coupling- Determination of self induction by Anderson's method – Determination of mutual induction – Eddy current – Transformer theory

UNIT-V: ALTERNATING CURRENT

A/C Circuits with single components – Double components – Measurement of current and voltage – Power in a.c Circuit – Power factor derivation – Wattless current – Choke-series and parallel resonance circuits – Impedance – Q factor – Selectivity and Sharpness of resonance

BOOKS FOR STUDY:

1. Electricity and Magnetism – Brijlal and Subramanian – Ratan Prakashan mandir – Delhi 1995

BOOKS FOR REFERENCE:

1. Electricity and Magnetism – Narayanamurthy & Nagarathinam.
2. Electricity and Magnetism – D.L. Seghal and Chopra.

APPLIED PHYSICS – ALLIED COURSE II – PRACTICAL (ANY 15 EXPERIMENTS ONLY).

1. Semiconductor diode – Characteristics
2. Zener Diode – Characteristics
3. FET – Characteristics
4. Transistor Characteristics – CE configuration
5. Transistor Characteristics – CB configuration
6. Bridge Rectifier and Zener controlled regulated power supply
7. Field along the axis of a coil – M
8. Field along the axis of a coil – H
9. Potentiometer Measurement of current
10. Potentiometer Measurement of resistance
11. Carey Foster's bridge – specific resistance
12. Calibration of a Thermistor and determination of its Energy gap
13. Series resonance circuit
14. Parallel resonance circuit
15. Single stage Amplifier
16. FET amplifier
17. Astable Multivibrator
18. Mathematical operators – Addition, Substraction using op-amp

APPLIED PHYSICS – ALLIED COURSE - III

OBJECTIVES:

- To understand the semiconductor, transistor and FET configuration.
- To study the basic concepts of MASER and LASER
- To study the Opto electronic devices
- To understand the characteristics of operational amplifier and its applications

UNIT-I: SEMICONDUCTOR PHYSICS

Theory of Energy bands in crystals – distinction between conductors, insulators and semiconductors – Intrinsic and Extrinsic semiconductors – Hall effect in semiconductors – Zener diode Tunnel diode Backward diode Breakdown voltage – avalanche Breakdown

UNIT-II: TRANSISTORS

PNP and NPN transistors DC Characteristics of CE and CB configuration – Hybrid parameters – Functions of Transistors as an amplifier and oscillator – FET – N – channel and P-Channel FET performance Characteristics FET amplifier

UNIT-III: LASERS AND MASERS

Basic concepts of stimulated emission – Population inversion and Meta stable state – Ammonia maser – Ruby laser and He Ne laser production – Advantages

UNIT-IV: OPTO ELECTRONIC DEVICES

LED: Radiation transition Emission spectra Luminent efficiency – Method of Excitation – Visible LED – Materials for LED – LED configuration and performance – Photo conduction – photo diode – Photo transistor – electronic watches – Seven segment displays – LCD

UNIT V – OPERATIONAL AMPLIFIERS

The basic operational amplifier – Inverting and Non inverting operational amplifier – Differential Operational amplifier – CMRR – Basic uses of Operational amplifier as sign and scale changer phase shifter, integrator. Differentiator and adder D/C – Binary weighted method – A/C Successive approximation – Op-amp as a comparator

BOOKS FOR STUDY:

1. Pulse and Digital electronics – G.K Mithal and Vanvasi – Khanna Publication – Delhi
2. Functional Electronics – Ramanan – TMH, 1994

BOOKS FOR REFERENCE

1. Microelectronics – Jacob Millman – MCGraw Hill
2. Pulse and Digital electronics – G.K Mithal and Vanvasi – Khanna Publication – Delhi
3. Electronic devices and Circuits – Millman & Halkias – TMH1991.