

Department of Physics
Details of Credits
B.Sc Physics

I Semester			
Part	Title of the Paper	Paper Code	Credits
I	Language Paper 1	1LT1/1LL1/1LH1/1LS1/ 1LF1	3
II	General English Paper 1	1GE1	3
III	Thermal Physics and Acoustics	1MP01a	5
	Electronics I	1EP01a	5
	Allied Mathematics 1	1AMP1	4
IV	Non Major Elective		2
	Value Education	OVE	2
II Semester			
Part	Title of the Paper	Paper Code	Credits
I	Language Paper 2	2LT2/2LL2/2LH2/2LS2/ 2LF2	3
II	General English Paper 2	2GE2	3
III	Mechanics and Properties of Matter	2MP02a	5
	Electronics II	2EP02a	5
	Main Practical I	2MPP1	5
	Elective Practical I	2EPP1	5
	Allied Mathematics 2	2AMP2	4
IV	Non Major Elective		2
	Environmental Studies - Theory	OEST	1
	Environmental Studies - Project and Viva voce	OESPV	1
III Semester			
Part	Title of the Paper	Paper Code	Credits
I	Language Paper 3	3LT3/3LL3/3LH3/3 LS3/1LF1	3
II	General English Paper 3	3GE3	3
III	Electricity and Electromagnetism	3MP03a	5
	Electronics III	3EP03a	5
	Allied Chemistry I	3ACP1	4
IV	Basic Wave Mechanics (Skill Based Subject)	OBWM	2

	Analytical Reasoning I	SAR1	2
	English Communication Skills I Theory	OECT1	1
	English Communication Skills I Practical	OECP1	1
IV Semester			
Part	Title of the Paper	Paper Code	Credits
I	Tamil Paper IV	4LT4/4LL4/4LH4/ 4LS4/4LF4	3
III	Classical and Statistical Mechanics	4MP04	5
	Alternate Energy Resources	4MP05b	5
	Electronics IV	4EP04a	5
	Allied Chemistry II	4ACP2	4
	Main Practical II	4MPP2	5
	Elective Practical II	4EPP2	5
	Allied Chemistry Practical	4ACPP	4
IV	General Knowledge	OGK	2
	Analytical Reasoning II	SAR2	2
V Semester			
Part	Title of the Paper	Paper Code	Credits
III	Optics I	5MP06a	5
	Relativity and Quantum Mechanics	5MP07a	5
	Atomic Physics and Crystallography	5MP08a	5
	Communication Electronics	5MP09b	5
	Mathematical Physics	5MP10	5
	Electronics V	5EP05a	5
IV	Analytical Reasoning III	SAR3	2
	English Communication Skills II Theory	OECT2	1
	English Communication Skills II Practical	OECP2	1
VI Semester			
Part	Title of the Paper	Paper Code	Credits
II	English for Competitive Examinations	4GE4	3
III	Optics II	6MP11a	5
	Nuclear and Particle Physics	6MP12a	5
	Multidisciplinary Physics	6MP13a	5
	Mathematical Statistics	6MP14	5
	Electronics VI	6EP06a	5
	Main Practical III	6MPP3	5
	Elective Practical III	6EPP3	5
IV	Quality Control Circles (Theory)	OQCC	1

	Quality Control Circles (Presentation)	OQCCP	1
V	Extension Service		2
	Industrial Training		2
III Semester			
III	ALLIED PHYSICS - I	4APC1 & 4APCS1	4
IV Semester			
III	ALLIED PHYSICS -II	4APC2 & 4APCS2	4
III	ALLIED PHYSICS – PRACTICAL	4APCP & 4APCSP	4

SEMESTER - I

MAIN PAPER I - THERMAL PHYSICS AND ACOUSTICS - 1MP01a

UNIT I: LOW TEMPERATURE PHYSICS

Joule - Kelvin effect - Porous plug experiment - liquefaction of gases - Linde's method of liquefying air-Helium I and II - adiabatic demagnetisation - practical applications of low temperature - refrigerating machine - electroflux refrigerator - Frigidaire - air conditioning machine - effect of CF_2Cl_2 on ozone layer.

UNIT II: THERMODYNAMICS I

Thermodynamic equilibrium - Zeroth law of thermodynamics - first law of thermodynamics - reversible and irreversible processes - Heat engine - Carnot's engine - Carnot's theorem - Internal combustion engines - petrol and diesel engines - thermodynamic scale of temperature.

UNIT III: THERMODYNAMICS II

Entropy - entropy and available energy - temperature - entropy diagram for Carnot's cycle - Maxwell's thermodynamical relations - application - Clausius - Clapeyron's latent heat equation - Helmholtz function - thermodynamical potentials - Gibbs functions - enthalpy - III law of thermodynamics - Nernst's heat theorem.

UNIT IV: CONDUCTION AND RADIATION

Thermal conductivity - rectilinear flow of heat - thermal conductivity of a good conductor - Forbe's method - thermal conductivity of a bad conductor - Lee's disc method - Radiation - blackbody radiation - Wien's law - Rayleigh-Jean's law - Planck's law - Stefan's law - Newton's law of cooling from Stefan's law - Solar constant - pyrometer - pyroheliometer.

UNIT V: ACOUSTICS

Simple harmonic motion - free, damped and forced oscillations - resonance - composition of two SHM at right angles (periods in the ratio 1:1) - Lissajou's figures - laws of transverse vibrations in stretched strings - Melde's string - transverse and longitudinal mode - determination of ac frequency using sonometer (steel and brass wires) - intensity and loudness of sound - intensity level - decibel - noise pollution. Ultrasonics - production - Piezo electric crystal method - magnetrostriction method application and uses - Acoustics of buildings - reverberation - absorption coefficient - Sabine's formula - acoustic aspects of halls and auditorium.

BOOK FOR STUDY

1. D.S. Mathur, (1978), Heat and thermodynamics, 3rd Edition, Sulfaan Chand & Sons, New Delhi.
2. Brijlal and Subrahmanyam (2000), Heat and thermodynamics, S. Chand & Co., New Delhi.
3. A.B. Gupta and H.P. Roy (1995), Heat and thermodynamics, First Edition, New Central Book Agency (P) Ltd., Kolkata - 700 009.
4. Khanna and Bedi (1998), Text Book of Sound, First Edition, Kedarnath Publisher & Co., Meerut.

BOOKS FOR REFERENCE

1. J.B. Rajam and C.L. Arora (1979), Heat and Thermodynamics, eighth Edition, S. Chand and Company Ltd., New Delhi.
2. Halliday / Resnick / Walker, Sixth Edition, Fundamentals of Physics, John Wiley and Sons, Asia Pvt. Ltd., Singapore.

ELECTIVE PAPER I - ELECTRONIC I - 1EP01a

UNIT – I: NETWORK THEOREMS

Kirchoff's current and voltage laws, maximum power transfer Theorem, Super-Position Theorem, Thevenin's and Norton's Theorem.

SEMI-CONDUCTOR THEORY

Energy band theory at solids - insulators, conductors and semi-conductors Drift current in semi-conductors - Intrinsic semi-conductors and extrinsic semiconductors, n-type and p-type semiconductor - mobility of charge carriers - Fermi level as a function of temperature, majority and minority carrier densities, law of mass action-conductivity of semi-conductor, Hall effect, Hall Co-efficient.

UNIT - II : SEMI CONDUCTOR DIODES

PN Junction-expression for the PN Junction-Forward and reverse bias characteristics of PN junction-breakdown mechanisms-avalanche and zener breakdown-zener diode characteristics tunnel diode characteristics.

PN Junction as a half wave and full wave rectifier-Bridge rectifier-choke as a filter-L section filter-II section filter Regulated power supply-zener diode, as a voltage regulator - series and shunt regulation.

UNIT - III: BIPOLAR JUNCTION TRANSISTOR

Construction and operation of Bipolar junction transistor (PNP and NPN). Three configurations of transistor connection – characteristic curves of transistor connection characteristic curves of transistor in common emitter and common base mode – definition of h-parameters – determination of the h-parameters of a transistor in common emitter and common base connections. D.C operation point and load line-Q point and maximum undistorted output-various methods of biasing Fixed base bias potential divider method of biasing - stability factor - thermal run away.

UNIT - IV : FIELD EFFECT TRANSISTORS

Construction and working of JFET- drain and transfer characteristics – JFET parameters-comparison at JFET and bipolar function transistor- Construction and working of MOSFET-Characteristics-comparison of JFET and MOSFET-Applications.

UNIT - V

Electronic devices-Basic CRO-operation cathode ray tube-vertical and horizontal deflection-measurement of frequency, phase and voltage using CRO lissajous figures Multimeter construction measurement of voltage current and resistances using multimeter.

Function generator-block diagram and description.

BOOKS FOR STUDY & REFERENCE

1. B.L. Theraja, 2003, Solid State Electronics, S. Chand & Co. Ltd, Ram Nagar, New Delhi.
2. R.S. Sedha, 2004, A Text Book of Applied Electronics, S. Chand & Co. Ltd, Ram Nagar, New Delhi.
3. V.K. Metha, 2000, Principles of Electronics, S. Chand & Co. Ltd, Ram Nagar, New Delhi.
4. M.K.Bagde and S.P.Singh, 1998, Elements of Electronics, S.Chand & Co. Ltd., New Delhi.
5. Gupta and Kumar, 2004, Handbook of Electronics, Pragati Prakashan, Meerut.
6. W.D.Cooper & A.D. Helfrick, Electronic Instrumentation & Measurement Techniques, Prentice Hall of India.
7. Rogu L. Tokheim, 1988, Theory & Problems of Digital Principles Schaum's outline series, Mc-Graw Hill Co.

SEMESTER-II

MAIN PAPER II - MECHANICS AND PROPERTIES OF MATTER - 2MP02a

1. MECHANICS - DYNAMICS

Projectile Motion - Range on an inclined plane, impulse and impact, oblique impact, impact of a sphere with a plane, loss of kinetic energy.

Dynamics of rigid bodies - Moment of inertia, radius of gyration, moment of inertia of a solid sphere, spherical shell, cylinder, conservation of angular momentum. Compound pendulum - theory, equivalent simple pendulum - reversibility of centres of oscillation and suspension, determination of 'g' and 'k'. Gyroscopic motion, spinning top.

2. CENTRE OF GRAVITY AND CENTRE OF PRESSURE

Centre of gravity of a solid hemisphere, hemispherical bowl, solid and hollow tetrahedron, cone, centre of mass.

Friction : Laws, angle of friction, cone of friction, friction dynamometer, friction clutch.

Thrust and pressure, centre of pressure - of rectangular, triangular and circular lamina, effect of further immersion.

3. HYDROSTATICS AND HYDRODYNAMICS

Stability of equilibrium of a floating body, meta centre condition for stability, determination of metacentric height.

Atmospheric Pressure - variation with attitude, height of homogeneous atmosphere.

Physics of Low Pressure - Production and measurement of low pressure - Gaede's molecular pump, rotary pump - Knudsen's absolute gauge, detection of leakage.

Hydrodynamics - Equation of continuity, Bernoulli's theorem and applications.

PROPERTIES OF MATTER

4. ELASTICITY : Hooke's law - Elastic moduli - relation between elastic constants, workdone in stretching and twisting a wire, twisting couple on a cylinder - rigidity modulus by static torsion - torsion pendulum.

Bending Of Beams

Cantilever - expression for bending moment, expression for depression - cantilever oscillations.

Experimental methods of finding young's modulus, non-uniform bending, uniform bending, Koenig's method, Searle's double bar pendulum, I - form girders.

5. SURFACE TENSION AND VISCOSITY

Surface Tension - Definition, excess pressure over curved surfaces, spherical and cylindrical drops and bubbles, variation of surface tension with temperature, Jaegar's method.

Viscosity - Coefficient of viscosity, rate of flow of liquid in a capillary tube, Poiseuille's expression, experimental determination of coefficient of viscosity - variation of coefficient of viscosity with temperature, viscosity of gases - Meyer's modification, Rankine's method. Applications of viscosity.

BOOKS FOR STUDY

1. Narayanamurthy and Nagarathinam, Mechanics (Vols. I & II). National Publishing Company.
2. D.S. Mathur, (1993), Properties of Matter, S. Chand and Company.
3. Murugesan (1994), Properties of Matter, S. Chand and Co.

BOOKS FOR REFERENCE

1. S.L. Loney, (1982), Dynamics, Macmillan India, Delhi.
2. S.L. Loney, (1982), Statics, Macmillan India, Delhi.
3. H.R. Gulati, (1982), Properties of Matter, R. Chand and Co

ELECTIVE PAPER II - ELECTERONICS II - 2EP02a

UNIT - I : SPECIAL SOLID STATE DEVICES

Varactor Diode, photodiode, opto-isolators, PIN diodes, LED- Characteristics and operation - seven segment display – solar cell, UJT characteristics-equivalent circuit of a UJT-intrinsic stand off ratio application as a saw tooth wave generator and over voltage detector.

UNIT - II : POWER ELECTRONICS

SCR – construction and working- characteristics equivalent circuit of SCR-SCR as a controlled rectifier (half wave and full wave rectifier) TRIAC – Operation characteristics-application as a high power lamp switch – DIAC characteristics-application as lamp dimmer.

UNIT - III : BINARY CODES, LOGIC GATES & CIRCUITS

Unsigned number representation to any base or radix-conversion of numbers from one base to another base-1's and 2's complements-subtraction using complements - representation for signed numbers-sign magnitude form-sign complement form - BCD, ASCII, Excess 3, Gray Code Parity Check,

OR, AND and NOT gates - Truth tables – Logic circuits and logic expression – Sum of the Products (SOP) – Product of Sums (POS).

UNIT – IV: BOOLEAN ALGEBRA

Fundamental concepts of Boolean algebra - Basic laws of Boolean Algebra-De-Morgan's theorem-NAND and NOR gates as universal building block - Half Adder and Full adder - Half subtractor and Full subtractor using XOR gates.

UNIT - V

TTL, ECL, CMOS, Logic families - parameter, speed, power consumption, packaging density, fan in fan out, voltage levels, compatibility, noise.

BOOKS FOR STUDY AND REFERENCE

1. B.L. Theraja, 2003, Solid State Electronics, S. Chand & Co. Pvt. Ltd., New Delhi.
2. R.S.Sedha, 2004, Applied Electronics, S. Chand & Co. Ltd., New Delhi.
3. V.K. Metha, 2000, Principles of Electronics, S. Chand & Co. Ltd., New Delhi.
4. J. Millman & Halkias, 1990, Integrated Electronics, McGraw Hill International, New Delhi.
5. Malvino and Leach 1996, Digital Principles and applications, 4th edn., McGraw Hill, New Delhi.
6. V. Vijayendran, 2005, Introduction to Integrated Electronics - Digital & Analog, S. Viswanathan Printers & Publishers Pvt. Ltd., Chennai.
7. V.Vijayendran, 2003. Digital fundamentals, 5th edn., S. Viswanathan Printers & Publishers Pvt. Ltd., Chennai.
8. R.P. Jain, 1993, Modern Digital Electronics, Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi.

SEMESTER II

MAIN PRACTICAL I - 2MPP1

1. Young's modulus - Non uniform bending – pin and microscope.
2. Young's modulus - Uniform bending – Scale and Telescope.
3. Compound pendulum - determination of g
4. Torsion pendulum – “n” of the wire - moment of inertia.
5. Bifilar pendulum - verification of perpendicular axes theorem.
6. Potentiometer - internal resistance of a cell.
7. Spectrometer - liquid prism - refractive index of liquid.
8. Post office box - resistance and specific resistance
9. Joule's calorimeter - specific heat of liquid - Barton's correction
10. Melde's String - frequency of the vibrator.
11. Thermal Conductivity of bad conductor – Lee’s disc method

ELECTIVE PRACTICAL I - 2EPP1

1. Construction of 5 volts power supply.
2. Full wave rectifier - construction and regulation using Zener diode.
3. Construction of basic logic gates using diodes and transistors.
4. FET Characteristics
5. UJT Characteristics
6. NAND as universal building block.
7. NOR as universal building block
8. DeMorgan's theorem - verification.
9. Half and full adder
10. Half and full subtractor,
11. Transistor characteristics - Common Emitter Mode

SEMESTER III

MAIN PAPER III - ELECTRICITY AND ELECTROMAGNETISM - 3MP03a

UNIT - I : CHEMICAL EFFECTS OF ELECTRIC CURRENT

Electrical conductivity of an electrolyte - Determination of specific conductivity of electrolyte (Kohlrausch Bridge) - Weston cadmium cell - Gibbs - Helmholtz equation for the emf of a reversible cell - calculation of emf of a Daniel cell - migration of ions - transport number - determination of transport number of electrolyte in which (1) no chemical action (2) chemical action - explanation of Seebeck, Peltier and Thomson effects on the electron theory - measurement of Thermo emf using potentiometer. Thermodynamics of Thermo couple - Thermo electric diagram and its uses - Thermo electric refrigerator - Thermo electric effect in p-type and n-type semiconductors.

UNIT - II : DC AND AC CIRCUITS

Growth and decay of current in a circuit containing resistance and inductance - growth and decay of charge in a circuit containing resistance and capacitor - determination of high resistance by leakage - growth and decay of charge in an LCR circuit - condition for the discharge to be oscillatory - frequency of oscillation.

AC voltage and current - power factor and current values in AC circuit containing LCR circuit - series and parallel resonant circuits - sharpness of resonance - Q. Factor - Wattless current skin effect - production and distribution of three phase A.C. - star and delta connections - series, shunt and compound wound dynamos with their characteristics - D.C. motor.

UNIT - III : MAGNETIC EFFECT OF ELECTRIC CURRENT

Biot and Savart's law - magnetic field intensity due to a solenoid carrying current - effect of iron core in a solenoid - Helmholtz galvanometer - moving coil Ballistic galvanometer theory - damping correction - uses of B.G.

Magnetic induction (B) - Magnetisation (M) - relation between B, H and M - magnetic susceptibility - BH curve (Ballistic method) - energy loss due to hysteresis - importance of hysteresis curve - magnetic circuit - magnetic circuit of an electromagnet - magnetic shielding.

UNIT – IV : ELECTROMAGNETIC INDUCTION AND ITS APPLICATIONS

Faraday's law of electromagnetic induction - self inductance - mutual inductance - coefficient of coupling - determination of self inductance of a coil using Anderson method - Experimental determination of absolute mutual inductance between a pair of coils by Raleigh's method - Earth inductor - measurement of horizontal component of the earth's magnetic field - measurement of vertical component of the earth's magnetic field - determination of angle of dip - search coil - solenoid inductor - Hibbert's magnetic standard - induction coil and its uses - Grassot Fluxmeter

UNIT IV : MAXWELLS EQUATION AND ELECTROMAGNETIC WAVES

Maxwell's equation in material media - displacement current and its magnitude - electromagnetic waves in free space - velocity of light - Hertz experiment for production and detection of electromagnetic wave - Poynting vector.

Motion of charged particles in uniform electric field (Longitudinal) - Motion of charged particle in electric field applied perpendicular to the direction of motion of particles - Motion of a charged particle in alternating electric field - Motion of charged particle in uniform constant magnetic field - Motion of charged particle in crossed Electric and Magnetic fields.

BOOKS FOR STUDY

1. M. Narayanamurthy and N. Nagarathnam, Electricity & Magnetism, 4th edition, National Publishing Co., Meerut.
2. D. Chattopodhyay and P.C. Rakshit, 2005, Electricity & Magnetism 6th edition, New Central Book Agency (P), Kolkata.

3. R. Murugesan, 2002, Electricity Magnetism, 4th edition, S. Chand & Co., New Delhi.
4. Brijlal and Subramaniam, Electricity and Magnetism, 6th edition, Ratan & Prakash, Agra.

BOOKS FOR REFERENCE

1. D.J. Griffiths, 2002, Introduction to Electrodynamics, 3rd edition, Prentice Hall of India, New Delhi.
2. B. Chakraborty, 2002, Principles of Electrodynamics, Books and Allied, Kolkata.
3. R.P. Feynman, R.B. Leighton and M. Sands, 1998, The Feynman Lectures on Physics, Vols. 2, Narosa, New Delhi.
4. K.K. Tewari, Electricity Magnetism, S. Chand & Co., New Delhi.

ELECTIVE PAPER III - ELECTRONICS III - 3EP03a

UNIT - I

Two port representation of a transistor - Hybrid equivalent circuit and h-parameter analysis of common emitter transistor amplifier - hybrid formulae for input and output impedance, voltage gain, current gain and power gain - RC coupled amplifier - voltage gain in low, mid and high frequency range - frequency - response cascaded amplifiers - FET as a voltage amplifier.

UNIT - II

Principle of feedback amplifiers - advantages of negative feedback - forms of negative feedback - voltage series feedback, voltage shunt feedback, current series and current shunt feedback, power amplifiers - difference between voltage and power amplifier - classification of amplifiers based on biasing conditions - class A power amplifier power rectangle - transformer coupled Class-A amplifier, Class B Pushpull amplifier - complementary symmetry Class B - Pushpull amplifier - Power gain in decibels.

UNIT - III

Sinusoidal oscillators - concept of positive feedback - Barkhausen's criterion for producing oscillations - audio oscillators - Hartley and Colpitt's Oscillator - Phase shift and Wein bridge oscillator (using discrete components) - determination of frequency and condition for frequency stabilization in each case - crystal oscillator.

UNIT - IV

Non-sinusoidal oscillators - multivibrator - astable, monostable and bistable multi vibrator - Schmitt trigger.

One bit memory - R.S. Flip flop - Clocked R.S. - D - JK Master / Slave and T. Flip Flop.

UNIT - V

Registers and counters, shift register, ring counter Johnson's Counter, Asynchronous ripple counter, divide by N - ripple counter, Mod-16 counter - with input and output waveforms synchronous counters.

BOOKS FOR STUDY AND REFERENCE

1. J. Millman & Halkias, 1990, Integrated Electronics. Mc-Graw Hill International, 10th edition, New Delhi.
2. M.K. Bagde and S.P. Singh, 1984, Elements of Electronics, S. Chand & Co., New Delhi.
3. J.P. Agrawal & Amit Agrawal, 1998, Solid State Electronics, Pragathi Prakashan Publishers, Meerut.
4. B.L.Theraja, 2003, Basic (Solid State) Electronics, S. Chand & Co., New Delhi.
5. V. Vijayendran, 2003, Digital Fundamentals, S. Viswanathan Printers & Publishers Pvt. Ltd., Chennai.
6. Malvino & Leach, 1996, Digital Principles & Applications, 4th Edition, Mc-Graw Hill.

SKILL BASED SUBJECT

BASIC WAVE MECHANICS - OBWM

UNIT 1 : MATRICES

Introduction to Matrices –Special Types of matrices – Transpose of a matrix – Conjugate of a matrix – Conjugate Transpose of a matrix – Symmetric and anti symmetric matrices – Singular and non singular matrices – Hermitian and skew Hermitian Matrices.

UNIT II : DETERMINANTS

Determinant of a matrix – Co factors of a determinant – Minors of the matrix – Adjoint of a matrix – Inverse of a matrix – Orthogonal Matrices – Unitary Matrices.

UNIT III : STATISTICS

Mean – Arithmetic mean – Geometric mean – Harmonic mean – Median – Mode – Measures of dispersion – Range – Mean deviation - Standard deviation.

UNIT IV: INTRODUCTION TO QUANTUM MECHANICS

Wave Particle duality - deBroglie's concept of Matter Waves – deBroglie Wavelength – Wave velocity and Group velocity- Experimental study of matter waves – Davisson and Germer's experiment – G.P.Thomson's experiment.

UNIT V : WAVE MECHANICS

Postulates of wave mechanics – Physical significance of a wave function – Operators – Position-energy –momentum operators – Commutation relations – Schroedinger's Time dependent and Time independent wave equations.

BOOKS FOR STUDY:

1. Satya Prakash, 2004, Mathematical Physics, Sultan Chand & Sons, New Delhi.
2. R.Murugeshan , Modern Physics S.Chand and Company Ltd.
3. Arthur Beiser , Concepts of Modern Physics by, Tata McGraw Hill Ltd.,New Delhi.
4. B.D.Gupta , Mathematical Physics ,Vikas Publishing House, UP

SEMESTER IV

MAIN PAPER IV - CLASSICAL AND STATISTICAL MECHANICS - 4MP04

UNIT - I

Mechanics of a system of particles - Generalised co-ordinates and constraints - Transformation equations - Configuration space - Principle of virtual work - D'Alembert's principle - Lagrange's equations from D'Alembert's principle for conservative - non-conservative systems and systems containing dissipative forces - Applications of Lagrange's equations.

UNIT - II

Hamilton's principle - Lagrange's equations from Hamilton's principle - Applications - Simple pendulum - Compound pendulum - Atwood's machine - A bead sliding on a uniformly rotating wire.

Lagrangian formulation of conservation theorems.

UNIT - III

Phase space - Hamiltonian function - Hamilton's equations - Motion of a particle in a central force field - Motion of a charged particle in an electromagnetic field.

UNIT - IV

Phase space - Density of states in terms of energy & momentum - Micro & macro states - Entropy & Probability - Ensemble & different types of Ensemble - Maxwell Boltzman distribution law to ideal gases in terms of energy - Maxwell Boltzman distribution law of velocity - Law of equipartition of energy.

UNIT - V

Quantum Statistics - Bose Einstein distribution law - photon gas - Pauli Paramagnetism - Fermi Dirac distribution law - Electron gas - thermionic emission - comparison of three statistics - Partition function - partition function & thermodynamical quantities.

BOOKS FOR STUDY

1. Gupta, Kumar and Sharma, Classical Mechanics, Pragati Prakashan, Meerut.
2. Gupta and Kumar, Elementary Statistical Mechanics, 20th edition, Pragati Prakashan, Meerut.

BOOKS FOR REFERENCE

1. H. Goldstein, 1980, Classical Mechanics II Ed., Narosa Publishing House, Madras.
2. Gupta V.P. and Basakhi Ram, Statistical Mechanics, Goel Publishing House, Meerut.
3. S.K. Sinha, Statistical Mechanics - Theory and Applications, Tata McGraw Hill Publishing Company, New Delhi.

MAIN PAPER V - ALTERNATE ENERGY RESOURCES - 4MP05b

Unit 1 : Conventional energy sources

Basic concepts of Energy - Forms of energy – Conventional energy sources - Fundamentals of Renewable energy sources – Comparison between conventional and renewable energy sources - Renewable energy sources and their sustainable development.

Unit 2 : Solar energy

Solar energy – Components – Solar constant – Solar radiation – Solar radiation geometry – Solar radiation measurements – Pyrheliometer – Pyranometer - Flat plate collector – Solar concentrator – Applications - Solar distillation – Solar cooker - Solar crop drying.

Unit 3 : Biomass energy

Origin of biomass – Photosynthetic process – Biomass sources – Gasification – Biogas generation – Classification - Bio mass as a source of energy – Ethanol from wood – Gasification of wood - Biogas for power generation.

Unit 4 : Wind energy

Wind energy – Turbine types – Operational characteristics - Wind energy resources – Nature of wind - Characteristics – Components of wind energy conversion system – Wind energy collectors – Horizontal axial machines – Vertical axis machines - Applications of wind energy – Merits and demerits.

Unit 5 : Geothermal energy , Ocean Thermal and Tidal Energy Conversion

Origin of geothermal energy – Geothermal resources – Application – Well drilling and fluid extraction – Utilization of geothermal resources – OTEC – Working principle – OTEC technology – Merits and demerits of OTEC – Applications of OTEC – Tidal energy – Working principle – Modes of operations – Merits and demerits.

Books for study:

1. Non conventional Energy Resources by G.D.Rai. Ed. IV 1997
2. Renewable energy resources by G.N. Tiwari and M.K.Ghoshal, 1st edition Narosa Publishing house.

Books for Reference:

1. Energy technology by S.Rao and Dr.B.R.Parulekhar 2nd edition 1997.
2. Solar energy , G.D.Rai Ed.1995
3. Renewable energy power for a sustainable future by Godfery Boyle, Alden Oess Ltd., Oxford 1996.
4. Energy models for 2000 and beyond by Jyothi Parikh, Tata McGraw Hill publishing company, New Delhi 1997

ELECTIVE PAPER IV - ELECTRONICS IV - 4EP04a

UNIT - I

Direct coupled amplifier - voltage gain of direct coupled amplifier - D.C. amplifier using complementary transistor - frequency response of DC amplifier - application of D.C. amplifier - Darlington amplifier - Differential amplifier - differential and common mode gain - CMRR.

UNIT - II

Operation amplifier: Basic idea of an opamp with black box concept, Opamp parameters - qualitative description of OPAMP - Virtual ground - Inverting and non inverting inputs.

Application of Opamp as an inverting and non-inverting amplifier, summer, difference amplifier, comparator - differentiating and integrating circuits using Opamp - solving simultaneous and differential equations.

UNIT - III

Opamp voltage regulator - series Opamp regulator IC Voltage regulators - 723 general purpose regulator CVCC, short circuit protection fold back - Switched mode power supply - operational principle and design. Wave form generator - square wave (astable), sine wave (Wein's oscillator).

Data converters : DAC - Weighted resistor method and R-2R ladder network, ADC - Successive approximation.

UNIT - IV

Simplifying logic circuits - sum of products - AND - OR network - NAND-NAND network - product of sum - Don't cares - Karnaugh's map - Pairs, quads and octets'.

UNIT - V

Combinational circuit : decoders / demultiplexers - BCD to decimal decoder - BCD to 7 segment decoder - designing of demultiplexer - multiplexer / data selector - encoder - code converter - binary adder - subtractor - digital comparator - parity checker / generator.

BOOKS FOR STUDY AND REFERENCE

1. Millman & Halkias, 1990, Integrated Electronics, Mc-Graw Hill Int. Book Co., New Delhi.
2. Malvino & Leach, 1996, Digital Principles & Application - 4th Edn. Mc-Graw Hill.
3. V. Vijayendran, 2003, Digital Fundamentals, S. Viswanathan Printers & Publishers Pvt. Ltd., Chennai.
4. D. Roy Choudhury, Shail Jain, 1998, Linear Integrated Circuits, New Age International (P) Ltd., Publishers.
5. Ramakant A. Gayakwad, 1995, 3rd Edn. Opamps & Linear Integrated circuits, Prentice - Hall of India.
6. B.L. Theraja, 2003, Basic Electronics (Solid State), S. Chand & Co., New Delhi.
7. Taub and Schilling, 1983, Digital Integrated Electronics, McGraw Hill, New Delhi.

SEMESTER IV

Main Practical II – 4MPP2

1. Static torsion – Determination of rigidity modulus
2. Cantilever – Mirror and telescope – Determination of Young's modulus
3. Newton's rings – radius of curvature of a convex lens
4. Air Wedge – Diameter of a thin wire
5. Spectrometer – i-d curve
6. Spectrometer- grating normal incidence – wavelength of mercury spectral lines
7. Potentiometer – Ammeter Calibration
8. Potentiometer – Specific resistance
9. Deflection magnetometer and vibration magnetometer- $\tan A$ and $\tan B$ – M and B_H
10. Field along the axis of a circular coil carrying current - B_H
11. Figure of merit – aperiodic galvanometer
12. Ballistic galvanometer – charge sensitivity
13. Ballistic galvanometer – absolute capacity
14. Ballistic galvanometer – comparison of emf of two cells
15. Ballistic galvanometer – internal resistance of a cell

Elective Practical – 4EPP2

1. R-C coupled amplifier – single stage (Demonstration)
2. Field Effect Transistor – voltage amplifier (Demonstration)
3. Hartley Oscillator
4. Colpitt's oscillator
5. Astable multivibrator
6. Construction of R-S, D, T and J-K flip flops using NAND gates
7. Operational amplifier – inverting, non – inverting amplifier
8. Operational amplifier –summing and difference amplifier
9. Binary adder and subtractor
10. Multiplexer and Demultiplexer
11. Encoder and Decoder
12. Digital comparator, parity checker and generator

SEMESTER V

MAIN PAPER VI - OPTICS I - 5MP06a

UNIT I: DEFECTS OF IMAGES

Cardinal points of an optical system, general relationships, thick lens and lens combination, telephoto lens, aberrations in images, chromatic aberration, achromatic combination of lenses in contact and separated lenses, monochromatic defect, spherical aberration and coma, their reduction aplanatic points of a sphere.

UNIT II: OPTICAL INSTRUMENTS

Optical instruments - eyepieces - need for multiple lens eyepiece, Huygen's and Ramsden's eyepiece, oil immersion objective phase contrast microscope, constant deviation spectrometer.

UNIT III: INTERFERENCE

Interference of light - air wedge the principle of superposition, coherence requirements for sources, Localized fringes in thin films, transition from fringes of equal thickness of those of equal inclination, Michelson interferometer - its uses for determination of wavelength, wavelength difference, Rayleigh's and Jamin's refractometer.

UNIT IV: DIFFRACTION

Fresnel diffraction - half period zones straight edge, explanation for rectilinear propagation.

Fraunhofer diffraction - diffraction at a slit, at a circular aperture and at a circular disc Resolution - Rayleigh's criterion - resolving power of telescope and microscope prism Diffraction grating - diffraction at N parallel slits, plane diffraction grating, resolving power of grating.

UNIT V: POLARIZATION

Double refraction and optical rotation, double refraction in uniaxial crystals, Huygen's theory phase retardation plates, rotation of plane of polarization, Fresnel's theory, Laurent's half shade polarimeter, Polaroid production and detection of different types of polarized light.

BOOKS FOR STUDY

1. Khanna & Gulati, 1991, Fundamental of Optics, R. Chand & Co., New Delhi.
2. Vasudeva, 1970, Text book of Light, Atma Ram & Sons, New Delhi.
3. Subramanyam & Brijlal, 1993, Text Book of Optics, S. Chand & Co., New Delhi.

BOOK FOR REFERENCE

1. Francis Jenkins & Harvey White, 4th edition, Fundamentals of Optics, McGraw Hill, Kogakusha.

MAIN PAPER VII - RELATIVITY AND QUANTUM MECHANICS - 5MP07a

UNIT - I : RELATIVITY

Frames of reference - Galilean transformation - Newtonian relativity - Michelson Morley Experiment - Co-ordinate transformation between inertial frames of reference - Einstein and origin of relativity theory - postulates of special theory of relativity - Lorentz transformation equation - Lorentz - Fitzgerald contraction - time dilation - relativity of simultaneity - experiment with mesons - relativity of space - addition of velocities - variation of mass with velocity - mass energy equivalence - conclusions of special theory of relativity - principle of equivalence Predictions of general theory of relativity - Minkowski's four dimensional space - four vectors - elementary ideas of general relativity.

UNIT - II : WAVE NATURE OF MATTER

Phase and group velocity - wave packet expression of De Broglie's wavelength - Davison and Germer's Experiment - G.P. Thompson's experiment - Heisenberg's uncertainty principle and its consequences i) Diffraction of electron in a grating ii) Electron viewed through a microscope iii) Why electrons cannot be inside the nucleus.

UNIT - III : SCHRODINGER EQUATION

Inadequacy of classical mechanics - Basic postulates of quantum mechanics Schrodinger equation - properties of wave function - probability interpretation of wave function - operator formalism - linear operators - self adjoint operators - expectation value - Eigen values and Eigen functions - commutativity and compatibility.

UNIT - IV : ANGULAR MOMENTUM IN QUANTUM MECHANICS

Orbital angular momentum operators and their commutation relations - separation of three dimensional Schrodinger equation into radial and angular parts - solution of the angular part and spherical harmonics as the Eigen

functions of L^2 and L_z (outline steps only) - elementary ideas of spin angular momentum of an electron - Pauli matrices.

UNIT - V : SOLUTIONS OF SCHRODINGER EQUATION

Free particle solution - particle in a box - potential well of finite depth (one dimension) - linear harmonic oscillator - rigid rotator and hydrogen atom.

BOOKS FOR STUDY

1. P.M. Mathews and K.Venkatesan, 1976, A text book of Quantum Mechanics, Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. Resnik R. 1979, Introduction to special relativity, Wiley Eastern Ltd., New Delhi.
3. R. Murgeshan, 2004, Modern Physics, S. Chand & Co., New Delhi.
4. V.K. Thankappan, 1985, Quantum Mechanics, Wiley Eastern Ltd., New Delhi.
5. B.K. Agarwal and Hari Prakash, 2001, Quantum Mechanics, Prentice Hall of India Pvt. Ltd., New Delhi.

BOOKS FOR REFERENCE

1. H.S. Mani and G.K. Mehta, 1988, Introduction to modern physics, Affiliated East - West Press, New Delhi.
2. Arthur Beiser, 1997, Concepts of Modern Physics, 5th Edition, Tata McGraw - Hill, New Delhi.
3. Pauling and Wilson, 1985, Introduction to Quantum Mechanics, Tata McGraw Hill, New Delhi.
4. A. Ghatala and Loganathan, 1984, Quantum Mechanics, Macmillan India Pvt. Ltd.,

MAIN PAPER VIII - ATOMIC PHYSICS AND CRYSTALLOGRAPHY - 5MP08a

UNIT - I : POSITIVE RAYS

Mass spectrographs - e/m of positive ions - Thomson's Parabola method - Aston's mass spectrograph - Dempster's mass spectrograph - isotopes and their uses

UNIT - II : ATOMIC STRUCTURE

Excitation and ionization potentials - Davis and Goucher, Frank and Hertz experiments - methods of excitation - vector atom model - various quantum numbers - Pauli's exclusion principle (electronic configuration of elements and periodic classification) - coupling schemes.

Magnetic dipole moment of electron due to orbital and spin motion - Bohr magneton - spatial quantisation - Stern and Gerlach experiment - Zeeman effect

UNIT - III : QUANTUM THEORY OF RADIATION

Planck's theory of quanta : Light quanta or photons, their existence, energy content, mass and momentum Planck's constant

Applications Of Quantum Theory Of Radiation

- 1. Photoelectricity** : Einstein's Photoelectric equation - experimental verification of Einstein's Photoelectric equation by Millikan's Experiment - Photo electric cells.
- 2. Compton Effect** : Definition - theory - derivation of expression - experimental verification.

UNIT 4 : X-RAYS

X-rays - continuous and characteristic X-ray spectra - absorption of X-rays by matter - concept of reciprocal lattice - diffraction of X-rays. - Details of Laue, rotating crystal and powder methods - applications of X-rays.

UNIT 5

Crystal lattice - primitive and unit cell - seven classes of crystal - Bravias Lattice - Miller Indices - structure of crystals - simple, cubic, hexagonal, close packed structure, faced centered cubic structure, Body centered cubic structure, simple cubic structure, sodium chloride structure, zinc blended structure and diamond structure.

BOOKS FOR STUDY AND REFERENCE

1. R. Murugesan - Modern Physics, S. Chand & Co., 8th Ed. 2001.
2. J.B. Rajam - Atomic Physics
3. Kittel, - Introduction to Solid State Physics, Wiley Eastern Ltd., 2003
4. S.O. Pillai - Science of Electronic Engg. Materials. Wiley Eastern Ltd.,

BOOKS FOR REFERENCE

Arthur. Beiser, Concepts of Modern Physics, Tata Mc Graw Hill, New Delhi, 1997.

MAIN PAPER IX - COMMUNICATION ELECTRONICS - 5MP09b

UNIT 1 : TRANSMISSION

Transmitter Radio Communication - Principle of radio telegraphy and telephony - simple A.M. and F.M. transmitter - block diagram - construction and working of single side band transmission - crystal filter and phasing method of SSB transmission - advantage of S.S.B.

UNIT 2 : MODULATION

Modulation Definition - Expression for amplitude modulated voltage - wave form of amplitude modulated voltage - side bands produced in amplitude modulation frequency modulation expression for FM voltage phase modulation - comparison of expression for phase modulation and frequency modulated voltage.

UNIT 3 : DETECTION & RECEPTION

Demodulation - definition - diode detection frequency demodulation - simple radio receiver - super heterodyne receiver block diagram of AM and FM receivers. Automatic volume control (AVC) - characteristic of superheterodyne receiver - beat frequency oscillator - reception of radio telegraphy and S.S.B. signal with B.F.O.

UNIT 4 : PULSE AND DATA COMMUNICATIONS

Pulse modulation - introduction - types - pulse width modulation - pulse position modulation (PPM) pulse code modulation (PCM) - Pulse Systems - Telegraphy - introduction to Data Communication - Principles

UNIT 5 : RADAR & TV

Radar : Radar - Radar range equation - transmitting system - Antenna scanning - the Duplexer, Radar Beacons - uses of Radar

TV : Scanning - interlaced scanning - horizontal and vertical scanning frequency composite video signal - TV transmission and reception - Block diagram and explanation - principle of colour TV - three colour theory. Mixing of colours - colour TV transmission and reception - Block diagram and explanation

BOOKS FOR STUDY AND REFERENCE

1. Gulat R.R., (1988) Monochrome & Colour TV, Wiley Eastern Ltd.
2. G. Keizer, (1991), 2nd Ed. - Optical Fibre Commn, New York. International Edns.
4. Kiver - Television simplified.
5. B. Grob, 1989, Basic Electronics - Prentice, 6th Edition Electronic & Radio Engineering, Terman, - Prentice Hall, India.
6. George Kennedy, Electronic Communication Systems, Tata Mc Graw Hill.
7. Gupta & Kumar, Handbook of Electronics, Prakathi Prakashan, 17th revised edition.
8. Taub & Shilling, 2006, Communication Systems, Mc Graw Hill Electronics, 15th reprint , 2nd edition.
9. Terman, Electronic and Radio Engineering.

MAIN PAPER X - MATHEMATICAL PHYSICS - 5MP10

UNIT I

Gradient of a Scalar field - Line, surface and volume Integrals Divergence of a Vector function - Curl of a vector function and its physical significance - Vector identities - Gauss divergence theorem - Stoke's theorem - Green's theorem - Applications of vectors of hydrodynamics, heat flow in solids, gravitation and electromagnetic field.

UNIT II

Characteristic equation of a matrix - Eigen values, Eigen vectors - Theorems on eigen values and eigen vectors - Diagonalisation of matrices - Matrices in Physics.

UNIT III

Differential equations and their solutions - 1 Hermite Differential equation and Hermite polynomial, generating function for Hermite Polynomial - Recurrences formulae for Hermite Polynomial, Orthogonality of Hermite Polynomials - Laguerre differential equation and Laguerre Polynomial

UNIT IV

Differential equations and their solutions : Legendre differential equation and Legendre function - Generating function of Legendre polynomials - Recurrence formula and Orthogonal properties of Legendre Polynomials

UNIT V

The Beta and Gamma functions - Definition of a) The Beta Function b) The Gamma Function - Symmetry property of Beta function - Evaluation of Beta & gamma function - Other forms of Beta & gamma function - Relation between beta & gamma functions - Evaluate of Miscellaneous integrals

BOOKS FOR STUDY AND REFERENCE

1. Satya Prakash, 2004, Mathematical Physics, Sultan Chand & Sons, New Delhi.
2. B.D. Gupta, 2000, Mathematical Physics, Vikas Publishing House, U.P.
3. M.R. Spiegel, 1981, Schaum's series, Matrices Mc-Graw Hill, New York.
4. M.R. Spiegel, 1981, Schaum's series, Vector Analysis, Mc-Graw Hill, New York.
5. A.W. Joshi, 1997, Elements of Group Theory for Physicists, 4th Edition, New Age International, New Delhi.

ELECTIVE PAPER V - ELECTRONICS V - 5EP05a

UNIT I

Integrated Circuit Technology: Advantages and limitations of integrated circuits – basic monolithic integrated circuit technology – various scales of integration – SSI, MSI, LSI, VLSI – basic processes used in monolithic technology – monolithic integrated components – different types of IC – PCB.

UNIT II

Memory organization: Basic ROM, PROM, EPROM – RAM – Dynamic RAM – basic ROM cell – basic RAM cell (both using gates) – block diagram of 2K X 8 ROM and 2K X 8 RAM and different signals associated with these chips.

UNIT III

Introduction to Microprocessors: Microprocessor as CPU, Architecture and programming of 8085 – Pin diagram and pin functions - Architecture of 8085 – – System bus structure - control, data and address buses – registers in 8085 – addressing modes of 8085 – register, direct, immediate and implicit addressing mode.

UNIT IV

Instruction Set of 8085: Instruction types based on the number of bytes and operation – data transfer, arithmetic, logical, branching , stack, I/O and machine control instructions – timing and sequencing – instruction cycle, machine cycle – halt state, wait state – timing diagram for opcode fetch, memory read and memory write cycles.

UNIT V

Assembly language programming: Simple programs (addition, subtraction, multiplication, division, code conversion – (BCD to Binary and Binary to BCD –

Binary to ASCII and ASCII to Binary) – ascending and descending order –block transfer.

Books for Study and Reference:

1. Ramesh S. Goankaer, 1997, Microprocessor, Architecture Programming and Applications with 8085, 3rd edition, Penram International Publishing, Mumbai.
2. V. Vijayendran , 2009, Fundamentals of microprocessor – 8085- Architecture , Programming & interfacing, Viswanathan Printers & Publishers Pvt. Ltd., Chennai
3. J. Millman and Halkias, 1990, Integrated Electronics, McGraw Hill International, New Delhi.
4. Malvino and Leach, 1996, Digital Principles and applicationals, 4th edition, McGraw Hill, New Delhi.
5. R.S. Sedha, 2004, Applied Electronics, S. Chand & Co. Ltd., New Delhi.
6. V.K. Metha, 2000, Principles of Electronics, S.Chand

SEMESTER VI

MAIN PAPER XI - OPTICS II - 6MP11a

UNIT I: LASER

Laser and hyperfine technology, light quanta and their origin, resonance radiation. Metastable state, population inversion, optical pumping, spontaneous and stimulated emission - Einstein coefficients (qualitative only), ruby and helium - neon lasers, Co₂ laser applications

UNIT II: FIBRE OPTICS

Fibre optics - principles, optical fibre modes and configuration, step index graded inclose fibre, loss in optical fibre transmission, optical fibre as communication medium, block diagrams of communication system, applications of fibre optics

UNIT III: HOLOGRAPHY

Holography - principle - recording of the image, reconstruction, characteristics of holographs, applications

UNIT IV: RESONANCE SPECTROSCOPY

Principle of NMR spectroscopy - spectrometer, simple applications

Principle of NQR spectroscopy - spectrometer, simple applications

Principle of ESR spectroscopy - spectrometer, simple applications

Principle of Moss Bauer spectroscopy - spectrometer, simple applications

UNIT V: ROTATIONAL VIBRATIONAL SPECTROSCOPY

Principle of Microwave Spectroscopy - spectrometer, simple applications.

Principle of IR Spectroscopy - spectrometer, simple applications.

Principle of Raman Spectroscopy - spectrometer, simple applications.

BOOKS FOR STUDY

1. C.N. Banwell, 1989, Fundamentals of molecular spectroscopy, Tata McGraw Hill.
2. R. Chang, 1971, Basic Principles of spectroscopy, McGraw Hill, Kogakusha.
3. B.B. Laud, 2nd edition, Lasers and Nonlinear Optics, New Age Publications.

BOOKS FOR REFERENCE

1. K. Thyagarajan & A.K. Ghatak, 1997, Lasers, Mc Millan India.
2. John M. Senior, 1998, Optical Fibre Communications, Prentice Hall of India.

MAIN PAPER XII - NUCLEAR AND PARTICLE PHYSICS - 6MP12a

UNIT – I : PROPERTIES OF NUCLEUS

General properties of nuclei nuclear size, charge, mass - determination of nuclear radius - mirror nucleolus method mass defects and binding energy - packing fraction - nuclear spin - magnetic dipole moment electric quadruple moment - nuclear models - liquid drop model - Weizacker semi empirical mass formula - magic numbers and shell model - collective model - nuclear forces - meson theory of nuclear force (qualitative).

UNIT - II : RADIOACTIVITY

Natural radioactivity, law of disintegration, half life and mean life period - units of radio activity, transient and regular equilibrium, radio carbon dating - age of earth - alpha rays - characteristics - Geiger Nuttal law - α - ray spectra - Gamow's theory of α - decay - (qualitative study) - beta rays - characterisation - beta ray spectra - neutrino hypothesis - parity violation - experimental evidence with C_{60} - gamma rays and internal conversion - nuclear isomerism.

UNIT - III : RADIATION DETECTORS AND PARTICLE ACCELERATORS

Ionisation chamber - G.M. Counter - quenching time and resolving time - scintillation counter - photomultiplier tube - bubble chamber - semi conductor counter - thermo luminescence dosimetry (TLD).

Linear accelerator - Cyclotron - Synchro Cyclotron - Betatron.

UNIT - IV : NUCLEAR REACTIONS

Conservation laws - nuclear reaction kinematics - Q - value - threshold energy nuclear reaction cross section - artificial radioactivity - radioisotopes and their uses - classification of neutrons - nuclear fission - chain reaction - four factor formula - critical mass and size - nuclear reaction - breeder reactor - transuranic elements - nuclear fusion - thermonuclear reactions - source of stellar energy.

UNIT - V : ELEMENTARY PARTICLES

Classification of elementary particles - fundamental interaction - elementary particle quantum numbers - conservation laws and symmetry - basic ideas about quark - quark model.

BOOKS FOR STUDY

1. D.C. Tayal, 2000, Nuclear Physics, Himalaya Publishing House, Mumbai.
2. R. Murugesan, 2002, Modern Physics, S. Chand and Co., New Delhi.
3. Irving Kaplain, 1962, Nuclear Physics, Oxford & IBH Publishers & Co., New Delhi.
4. H.S. Mani and G.K. Mehta, 1990, Introduction to Modern Physics, Affiliated East - West Pvt. Ltd., New Delhi.

BOOKS FOR REFERENCE

1. Roy and Nigam, 1997, Nuclear Physics, Wiley Eastern Ltd., New Delhi.
2. M.L. Pandya and R.P.S.Yadav, 1989, Elements of nuclear physics, 6th Edition Kedarnath Ramnath, Meerat.
3. Blalt and Weisskoft, 1952, Theoretical Nuclear Physics, 1st edition, John Wiley and Sons, New York.
4. R.C. Sharma, 1986, Nuclear Physics, K. Nath and Co., Meerut.

MAIN PAPER XIII - MULTIDISCIPLINARY PHYSICS - 6MP13a

UNIT I BIO PHYSICS

Introduction – Biostatics – Biophysics of muscle – Strength of bones – Bio dynamics – Locomotion in land – Locomotion in air – Biomechanics – Biomechanics of cardiovascular system – Cellular biophysics – Prokaryotes – Lipids – Proteins – Amino acids – Bioenergetics- Cellular respiration – Neuro biophysics – Nerve excitation.

UNIT II - NANO TECHNOLOGY

Nanomaterials – Synthesis – Vapour condensation – Chemical synthesis – Mechanical deformation – Thermal crystallization – physical properties – electron affinity – magnetism – mechanical behavior – Applications.

UNIT III - ASTRO PHYSICS I

Introduction – Classification of stars – Hertspring – Russel diagram – Luminosity of star – Maturity – Ageing – Death of the star – White dwarf – Chandrasekar limit – Neutron stars – Black holes – Supernova Explosion.

UNIT IV - ASTROPHYSICS II

Asteriods – Physical nature of asteroids – Origin and evolution of asteroids – Collision between asteroid and earth comets – Physical nature of comet – Origin and evolution of comet – Collision between comet and earth – Big Bang Theory – Hubble law.

UNIT V - MEDICAL INSTRUMENTS

Blood pressure – Sphygmomanometer – Heart rate – Stethoscope – Intensive Care Unit (ICU) – Nuclear Magnetic Resonance (NMR) – Magnetic Resonance Imaging (MRI) – Computer Tomography (CT) scan – Positron Emission Spectroscopy (PES) – Ultrasound Imaging – Gamma camera.

BOOKS FOR STUDY

1. P.K.Srivatsava, Elementary Bio Physics – An introduction, 2005, Narosa publishing house.
2. Vasantha Pattabhi & N.Gowtham, BioPhysics , 2002, Narosa publishing house.
3. Arumugam, Material Science, 2002, Anuradha Agency Publishers.
4. George O.Abell, Exploration of the Universe, IV edition, 1981, Saunders College Publications, Newyork.
5. Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer, Biomedical Instrumentation & Measurements, II edition.
6. M.Arumugam, Bio medical Instrumentation.
7. John G.Webster, Biomedical Instrumentation.

BOOKS FOR REFERENCE:

1. Walter Hoppe & Wolfgang Lohman, Bio Physics, 1982, Springer Verlag, Berlin.
2. Jay M.Pasachoff, Contemporary Astronomy, 1981, Philidelphia Saunders College
3. Laurence W.Fredrick Robert H.Baker , Astronomy, 1976 D.van Nostrand Company New York.

ELECTIVE PAPER VI - ELECTRONICS VI - 6EP06a

UNIT I

Microprocessor: Introduction to INTEL processors -8086 microprocessor - minimum and maximum mode of 8086 – Pin diagram and pin functions of 8086 – Internal architecture of 8086 microprocessor – Functions of Bus Interface unit and execution unit - Effective and physical address – pipelining.

UNIT II

Machine code and assembly language – Programmers model of 8086 – Various addressing modes of 8086 – Immediate addressing, register addressing, memory addressing – direct and indirect (register, based, indexed, based and indexed with displacement) - I/O port addressing –fixed and variable port addressing.

UNIT III

Instruction templates: Template for data transfer between a register and register/memory – code generation using template.

Data transfer instructions: Move data – transfer data from segment register – Push and Pop – Exchange – Data transfer with I/O ports.

Data conversion Instructions: Translate value in AL – Load EA of memory location into register.

String Instructions: Move - Store – Load – Compare – Scan string.

UNIT IV

Arithmetic instructions: Add-Subtract- Negate-Compare-multiply-divide

Logical Instructions: AND- OR – EXOR –TEST – NOT – Rotate – Shift

Process control Instructions: Set/Reset flags – Halt – Wait .

Branch Instructions: Conditional jumps based on single flag – Conditional jumps based on multiple flags – unconditional jump – iteration – Call - Return.

UNIT V

Writing an assembly language program: Assembler and assembler directives - General program structure – assembling, linking, testing and executing the program – Simple programs: addition, subtraction, multiplication, division-with 16 bit numbers.

Books for Study and Reference:

1. V. Vijayendran, (2007), Fundamentals of Microprocessor – 8086, S. Viswanathan Printers & Pub. Pvt. Ltd.,
2. K Udaya Kumar and B.S. Uma Shankar, (1998), Advanced Microprocessors and IBM-PC Assembly Language Programming, Tata McGraw Hill.
3. A.P Mathur, (1989), Introduction to Microprocessor, Third Edition, Tata McGraw Hill.
4. Douglas V Hall, (1986), Microprocessor and interfacing Programming and Hardware, McGraw Hill, Inc.,
5. Mohammed Rafiquzzaman, (1997), Microprocessor and micro-computer based system design, Universal Book Stall, New Delhi.

SEMESTER VI

Main Practical III - 6MPP3

1. Spectrometer – $i-i'$ curve
2. Spectrometer – Narrow angle prism
3. Newton's rings – determination of refractive index of material of a convex lens
4. Potentiometer – Calibration of High range voltmeter
5. Potentiometer – emf of a thermocouple
6. Field along the axis of a coil and vibration magnetometer - B_H
7. Deflection Magnetometer – $\tan C$
8. Mirror Galvanometer - emf of a thermocouple
9. Carey – Foster's bridge – temperature coefficient of resistance
10. Ballistic galvanometer – Comparison of mutual inductance between two pair of coils
11. Ballistic galvanometer – Determination of mutual inductance of a pair of coil
12. Ballistic galvanometer – Comparison of capacitances – De Sauty's bridge
13. Ballistic galvanometer – High resistance by leakage
14. LASER – Determination of wavelength and particle size
15. Fibre Optics – Numerical aperture and acceptance angle

Elective Practical III – 6EPP3

1. Shift register, ring counter and Johnson's ring counter
2. Ripple up – down counter
3. OP Amp – R-2R ladder – DAC
4. Op Amp – binary weighted resistance – DAC
5. 8085 microprocessor – addition, subtraction
6. 8085 microprocessor – multiplication, division
7. 8085 microprocessor – code conversion
8. 8085 microprocessor – ascending and descending order
9. 8086 microprocessor – addition, subtraction
10. 8086 microprocessor – multiplication, division
11. 8086 microprocessor – DAC interfacing
12. 8086 microprocessor – ADC interfacing
13. 8086 microprocessor – key board interfacing
14. 8086 microprocessor – LED interfacing
15. Mathematical Operations – 8086 microprocessor - MASM programming

ALLIED PHYSICS - I

(Common Syllabus for B.Sc. Chemistry & B.Sc. Computer Science)

(3APC1 & 3APCS1)

UNIT I – PROPERTIES OF MATTER AND MECHANICS:

Elastic constants – Different moduli of elasticity and relations between them – Energy stored in a stretched wire - Bending of beams – Expression for bending moment – theory and experimental determination of Young's modulus by non-uniform bending – Torsion in a wire – Determination of rigidity modulus by torsional pendulum and static torsion.

Compound pendulum - determination of g and K

UNIT II – SOUND:

Waves and oscillations – Simple harmonic motion – composition of two simple harmonic motion at right angles (period in ratio 1:1) – expression for the velocity of transverse waves in a stretched string – frequency of transverse waves of a stretched string – laws of transverse vibration of a string – verification of laws of transverse vibration of strings – Melde's string -transverse and longitudinal modes –ultrasonics – production – Piezoelectric method – application and uses .

UNIT – III: LOW TEMPERATURE PHYSICS:

Joule Kelvin Effect –Theory of Porous plug experiment – Expression for temperature of inversion -Regenerative cooling – Liquefaction of air –Linde's method - Properties of Helium I and Helium II – adiabatic demagnetization – practical application of low temperature – refrigeration – Frigidaire refrigerator – air conditioning – air conditioner – effect of CF_2Cl_2 on ozone layer

UNIT IV - OPTICS:

Interference – theory of thin films - air wedge –determination of thickness of thin wire - Newton's rings - determination of radius of curvature - diffraction – Fresnel's explanation of rectilinear propagation of light

– theory of transmission grating - determination of wavelength - optical activity – specific rotation – Laurent’s half shade polarimeter.

UNIT V – ELECTRONICS

P-N Junction diode – forward and reverse bias characteristics – P N junction diode as a half wave and full wave rectifier – Bridge rectifier- Zener diode characteristics – Zener diode as voltage regulator — PNP and NPN transistors – CE,CB and CC modes of operation - Characteristic curves of transistor in common emitter mode – single stage common emitter transistor amplifier

Binary number system – binary addition – subtraction – analog and digital signals – basic logic gates using discrete components – De Morgan’s theorems – NAND as Universal gate – NOR as Universal gate – half adder and full adder – half subtractor and full subtractor.

BOOKS FOR STUDY

1. D.S. Mathur - Elements of properties of matter, S. Chand & Co.
2. Subrahmanyam and Brijlal - Text Book of Sound, Vikas Publishing House Pvt. Ltd., New Delhi.
3. Brijlal and Subrahmanyam - Text Book of Optics.
4. R. Murugesan - Electricity and Magnetism, S. Chand and Co.

BOOKS FOR REFERENCE

1. Nelkon and Parker Advanced level Physics - Arnold - Heinemann.
2. Resnick and Halliday - Physics Vol. I and Vol. II - Wiley Eastern Ltd

ALLIED PHYSICS - II

(Common Syllabus for B.Sc. Chemistry & B.Sc. Computer Science)

(4APC2 & 4APCS2)

UNIT I – MODERN PHYSICS

Critical Potential – Ionization potential and Excitation potential - Experimental Determination of critical potentials – Franck & Hertz Experiment. Nuclear Models -liquid drop model – shell model – magic numbers. Basic ideas about elementary particles and quarks - classification of elementary particles – quark model of nucleon.

Relativity – Frames of references – Galilean Transformation equations – postulates of special theory of relativity – Lorentz transformation equations – length contraction – time dilation – mass energy equivalence. Wave particle duality – De Broglie wavelength – Experimental verification – G.P. Thomson’s experiment.

UNIT – II ELECTRICITY AND MAGNETISM:

Biot Savort’s law – field along the axis of a circular coil –force on a current carrying conductor in a magnetic field – Fleming’s left hand rule – torque on a current loop in a uniform magnetic field - moving coil ballistic galvanometer theory – damping correction – measurement of figure of merit of a B.G - uses of B.G - AC voltage and current – ac motor –single phase, three phase, star and delta connection – skin effect - electric circuit switches – fuses – circuit breaker-relay.

UNIT III – COMMUNICATION ELECTRONICS:

Radio broadcasting – transmission and reception – modulation – need for modulation – types of modulation – modulation factor – mathematical analysis of AM wave – side band frequency in AM wave – limitation of amplitude modulation – demodulation – essentials in demodulation – types of AM radio receiver – block diagram and explanation – straight receiver – super –heterodyne radio receiver.

UNIT IV – FIBRE OPTICS:

Propagation within fibre – acceptance angle – numerical aperture - structure of optical fibre – classification of optical fibre – modes of propagation – single mode and multimode – light propagation through an optical fibre – losses in fibre – acceptance angle – numerical aperture – advantage and disadvantage of optical communication.

UNIT V – ELECTRONICS

Operational amplifier – Block diagram of op amp - Characteristics of ideal op amp – Virtual ground concept – Inverting and Non-inverting amplifier- Basic op amp applications – Scale changer/inverter, inverting summing amplifier, voltage follower and subtractor - op amp as differentiator – integrator.

BOOKS FOR STUDY

1. R. Murugesan, Modern Physics, S. Chand & Co.
2. R. Murugesan, Electricity and Magnetism, S. Chand & Co.
3. V.K. Mehta, Principle of Electronics, S. Chand & Co.
4. Subrahmanyam, Applied Electronics, National Publishing company
5. Gerd Keiser - Optical Fibre Communication, McGraw Hill Publications
6. V.Vijayendran, Digital Fundamentals and Applications, S.Viswanathan & Co

ALLIED PHYSICS – PRACTICAL

(Common for B.Sc. Chemistry & B.Sc. Computer Science)

(4APCP & 4APCSP)

1. Young's Modulus by non – uniform bending – pin and microscope
2. Rigidity Modulus by static torsion
3. Rigidity Modulus by torsional oscillations
4. Melde's string – frequency of tuning fork
5. Sonometer - frequency of tuning fork
6. Air Wedge – thickness of a wire
7. Newton's rings – radius of curvature
8. Spectrometer- grating normal incidence – wavelength of mercury spectral lines
9. Potentiometer – calibration of ammeter
10. Field along the axis of a circular coil carrying current – deflection magnetometer
11. Figure of merit – aperiodic galvanometer
12. Half adder and half subtractor
13. Characterization of Zener diode – voltage regulation
14. Construction of AND & OR gates using diodes and NOT gate using transistor
15. NAND as universal building block
16. NOR as universal building block
17. Op – Amp – Inverting & non inverting amplifier
18. Op – Amp – summing and difference amplifier