<u>B.Sc. PHYSICS</u>

CORE PAPER I-SEMESTER-I
P1-PROPERTIES OF MATTER AND ACOUSTICS

UNIT I: ELASTICITY

Hooke's law - Stress – Strain Diagram –Elastic moduli – Relation between elastic constants – Poisson's Ratio –Expression for Poisson's Ratio in terms of elastic constants – Work done in stretching and twisting a wire – Twisting couple on a cylinder – Rigidity modulus by static torsion – Torsional pendulum – Rigidity modulus and moment of inertia.

UNIT II: BENDING OF BEAMS

Cantilever – Expression for bending moment – Expression for depression – Cantilever oscillations – Expression for time period – Experiment to find Young's modulus – 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: FLUIDS

Surface Tension : Definition and dimensions of surface tension – Excess of pressure over curved surfaces – Application to spherical and cylindrical drops and bubbles – Variation of surface tension with temperature – Jaegear's method.

VISCOSITY:

Co-efficient of viscosity and its dimensions – Rate of flow of liquid in a capillary tube – Poiseuille's formula – Experiment to determine Co-efficient of viscosity of a liquid – Variation of viscosity of a liquid with temperature – Applications of viscosity.
Physics Of Low Pressure: Production and Measurement of low pressure – Gaedes molecular pump – Rotary pump – Knudsen Absolute gauge – Detection of leakage.

ACOUSITCS

UNIT IV: WAVES AND OSCILLATIONS

Simple Harmonic Motion – Free, Damped, Forced vibrations and Resonance – Fourier's Theorem – Application of sawtooth wave and square wave – Intensity and Loudness of sound – Decibels – Intensity levels – Noise pollution.

UNITV: ULTRASONICS

Production of ultrasonic waves – Piezo electric crystal method – Magnetostriction method – Properties – Application to science, industry and medicine.
Acoustics of buildings: Reverberation and time of reverberation – Absorption co-efficient – Sabine's formula – Measurement of Reverberation time – Acoustic aspects of halls and auditoria.

BOOKS FOR STUDY

1. **Properties of Matter** by Murugeshan.R. , S.Chand & Co pvt. Ltd., New Delhi.1994.
2. **Properties of matter** by Brijlal and Subramaniam .N, Eurasia Publishing Co., New Delhi 1989.
3. **Text book of Sound** by Brijlal and Subramaniam.N, Vikas Publishing House, New Delhi, 1982.
4. **Text book of Sound** by M.N. Srinivasan-Himalaya Publications.

BOOKS FOR REFERENCE

1. **Elements of properties of matter** by Mathur.D.S, Shyamlal Charitable trust , New Delhi,1993.
2. **Fundamentals of General properties of matter** by Gulati.H.R, R.Chand and Co. New Delhi, 1982.
3. **Waves and Oscillations** by Subrahmanyam.N. And Brijlal, Vikas Publishing house pvt. Ltd, New Delhi, 1994.
4. **A Text book of sound** by Khanna.D.R & Bedi.R.S., Atma Ram & Sons, New Delhi. (1985).
5. Mechanics and General properties of matter by P.K. Chakrabarthy – Books and Allied (P) Ltd., 2001.
6. **Fundamentals of physics**, 6th Edition, by D. Halliday, R.Resnick and J. Walker, Wiley, NY, 2001.
7. **Physics**, 4th Edition, Vols.1, 2&2 Extended by D. Halliday , R.Resnick and K.S.Krane, Wiley,NY,1994.
8. **CRC Handbook of Physics and Chemistry**, 80th Edition.,CRS press, NY, 1999.
9. **The Feynman Lectures on physics**, Vols. 1,2&3,by R.P.Feynman, R.B.Leighton and M.Sands Narosa, New Delhi,1998.

CORE PAPER II-SEMESTER-II

P2 – HEAT AND THERMODYNAMICS

UNIT 1: THERMOMETRY AND CALORIMETRY

Platinum resistance thermometer – Callender and Griffith's bridge- Thermistor – Specific heat capacity – Specific heat capacity of solids – Dulong and Petits law – Specific heat capacity of liquid – Method of mixtures – Barton's correction – Specific heat capacity of gases – C_p and C_v by Regnault's and Callender and Barne's methods – Variation of specific heat capacity of diatomic gases.

UNIT II: THERMODYNAMICS

Zeroth law of Thermodynamics – First law of Thermodynamics – Heat engines – Petrol and diesel engines – Reversible and irreversible processes– Second law of thermodynamics – Thermodynamic scale of temperature – Entropy – Change of entropy in reversible and irreversible process- Temperature-entropy diagram – Maxwell's Thermodynamic equations and its applications- Third law of thermodynamics.

UNIT III: LOW TEMPERATURE PHYSICS

Joule Thomson Effect – Porous plug experiment – Liquefaction of gases (air, hydrogen, helium.) – Adiabatic demagnetization – practical applications of low temperatures – Refrigeration – carnot's cycle - refrigerator – electrolux refrigerator- Frigidaire – air conditioning machines – effects of CF_2Cl_2 on ozone layer.

UNIT IV: CONDUCTION AND RADIATION

Definition of thermal conductivity –thermal diffusivity - thermal conductivity of bad conductor – Lee's Disc method – radiation – black body radiation – Energy distribution in blackbody radiation –Kirchoff's law –Wein's law, Rayleigh – Jean's law and Planck's law – Stefan's law – determination of Stefan's constant -pyrometry – Polarising optical pyrometer - Solar constant – temperature of sun
.
UNIT V: STATISTICAL PHYSICS

Quantum statistics of identical particles – Maxwell-Boltzmann, Bose-Einstein and Fermi Dirac Statistics – Applications – Bose –Einstein and Fermi – Dirac gases as degenerate gases.

BOOKS FOR STUDY

1. **Thermal Physics** – D.Jayaraman, K.Ilangovan. .
2. **Heat and Thermodynamics** – D.S. Mathur.
3. **Heat and Thermodynamics** – Brij Lal and Subramaniam, S.Chand & Co. 16th Edition.
4. **Elementary Statistics** – Gupta and Kumar.

BOOKS FOR REFERENCE

1. **Heat and Thermodynamics** – J.B.Rajam and C.L. Arora.
2. **Thermodynamics and Statistical Physics** – Sharma and Sarkar.
3. **Statistical Mechanics** – Sathya Prakash and C.Agarwal
4. **Fundamentals of Physics**,6th Edition, by D.Halliday,R.Resnick and J.Walker, Wiley, NY,2001.
5. **Thermal Physics** , A.B.Gupta and H.Roy, Books and Allied(P) Ltd., (2002)
6. **Physics**, 4th Edition,Vols.1,2&2 extended by D.Halliday,R.Resnick and K.S. Krane,Wiley,NY,1994.
7. **CRC hand book of physics and Chemistry**, 80th Ed.,CRS press,NY,1999.
8. **The Feynman Lectures on Physics**,Vols.1,2&3 by R.P.Feynman, R.B.Leighton and M Sands, Narosa, New Delhi,1998.

CORE PRACTICAL-I (PH2)
(At the end of Second Semester)

Time: 3 Hrs   **Marks: 100**

                                                   Internal: 40

                                                   External: 60

1. Young's modulus – Non-uniform bending - Pin & Microscope
2. Young's modulus – Uniform bending – Optic lever
3. Rigidity modulus – Torsional pendulum (without identical masses)
4. Rigidity modulus - torsional pendulum (with masses)
5. Surface tension and interfacial surface tension drop weight method.
6. Coefficient of viscosity of liquid – Graduated burette (radius of capillary tube by Mercury pellet method)
7. Sonometer – Frequency of tuning fork and mass of the solid.
8. Sonometer –R.D. of a solid and liquid.
9. Specific heat capacity of liquid –Newton's law of cooling
10. Specific heat capacity of liquid – Method of mixtures(Half-time correction)
11. Focal length, power, R and μ of a convex lens.
12. Focal length, Power, R and μ of a concave lens.
13. Spectrometer - μ of a Solid.
14. Spectrometer- μ of a liquid.
15. P.O. Box – Temperature coefficient of resistance.
16. Potentiometer – Voltmeter Calibration.
17. Potentiometer-Internal Resistance.

 Note: Use of Digital balance is permitted.

A: Core Papers (Maximum 75 Marks):

PART A (10x 2=20 marks)
Answer all the questions.

Question #	Unit
1&2	From Unit 1
3&4	From Unit 2
5&6	From Unit 3
7&8	From Unit 4
9&10	From Unit 5

PART B (5x5=25 marks)
Answer any FIVE Questions.

Question #	Unit
11.	From Unit 1
12.	From Unit 2
13.	From Unit 3
14.	From Unit 4
15.	From Unit 5
16.	From ANY Unit
17.	**Problem** from any Unit(s)

PART C (3x10=30 marks)
Answer any three questions

Question #	Unit
18.	From Unit 1
19.	From Unit 2
20.	From Unit 3
21.	From Unit 4
22.	From Unit 5

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S.D.N.B. VAISHNAV COLLEGE FOR WOMEN
CHENNAI – 44

DEPARTMENT OF PHYSICS
SYLLABUS
I YEAR ─ ALLIED
I/III& II/IV SEMESTER

ALLIED PHYSICS PAPER – I
Common to Mathematics and Chemistry

UNIT I : SIMPLE HARMONIC MOTION AND CIRCULAR MOTION

Composition of two Simple harmonic motions along a line and at right angles – Lissajous figures. Uniform circular motion – Acceleration of a particle in a circle – centripetal and Centrifugal forces – centrifuge – motion of a Bicycle and a car around a circle – Banking on curved tracks.

UNIT II: PROPERTIES OF MATTER

Elasticity: Elastic constants – Bending of beams – young's modulus by non-uniform bending – energy stored in a Stretched wire – torsion in a wire – determination of rigidity modulus by torsional pendulum – static torsion.

VISCOSITY:

Coefficient of viscosity – Poissuelle's formula – Comparison of viscosities – burette method – Stokes's law – Terminal velocity – viscosity of highly viscous liquids – lubrication.

SURFACE TENSION:

Molecular theory of surface tension – Excess pressure inside a drop and bubble – surface tension by drop weight method – interfacial surface tension.

UNIT III: HEAT AND THERMODYNAMICS

Kinetic theory of gases – Vanderwaal's equation of state – Derivation of critical constants – Low temperature – Joule-Kelvin effect – Theory and applications – Liquification of gases – Linde's process – adiabatic demagnetization – laws of thermodynamics – entropy - change of entropy in reversible and irreversible process.

SOUND: TRANSVERSE VIBRATION OF A STRETCHED STRING

Expression for the velocity of transverse waves – laws of transverse vibrations – A.C.Frequency measurement using sonometer- Velocity of sound in a gas – ultrasonics – production and uses.

UNIT IV: ELECTRICITY AND MAGNETISM

Capacitor – energy of charged capacitors – Loss of energy due to sharing of charges - potentiometer – internal resistance of a cell and thermo emf measurement – Magnetic Field due to a current carrying conductor – Biot-Savart's law – Field along the axis of the coil – force in a conductor carrying current in a magnetic field – Ballisitc galvanometer – Circuit control and protective devices – switch – its types – fuses- circuit breaker – Relays

UNIT V: GEOMETRICAL OPTICS

Refraction – Normal refraction – Refractive index by microscope – by air cell-refraction at grazing incidence - grazing emergence in prisms – combination of two prisms to produce dispersion without deviation and deviation without dispersion – defects of images – Coma, Distortion - Spherical and chromatic aberration in lenses

BOOKS FOR STUDY AND REFERENCE

1. **Allied physics** by Dr.K.Thankaraj and Dr.D.Jayaraman
2. **Heat and thermodynamics** by J.B.Rajam.
3. **Elements of properties of matter** by Brij Lal and Subramanian.
4. **Mechanics** by Narayanamoorthy and others.
5. **Applied Electronics** by R.S.Sedha.

SEMESTER II/IV
ALLIED PHYSICS – PAPER II
Common to Mathematics and Chemistry

UNIT I: PHYSICAL OPTICS

Velocity of light – Michelson's method – Interference in thin films – Interference in wedge shaped films – Newton's rings – Measurement of wave length and radius of curvature with theory – Diffraction- Fresnel's explanation of rectilinear propogation of light – theory of transmission grating – Nicol prism – optical activity – polarimeter.

UNIT II: ATOMIC PHYSICS

Atom model – vector atom model – electron, spin, quantum numbers – Pauli's exclusion principle – excitation and ionization potentials – experimental determination – Franck and Hertz method.

UNIT III: NUCLEAR PHYSICS

Nuclear model – liquid drop model –nuclear energy – mass defect – Binding energy – Radio activity – Nature of Alpha, Beta, Gamma rays – Exponential law – Half life period – mean life period – fission and fusion – atom bomb – nuclear reactor – Thermo nuclear Reactions – Solar energy.

UNIT IV: QUANTUM MECHANICS

De Broglie matter waves- characteristics-wavelength – Uncertainity principle – postulates of wave mechanics – types of operators – Schrodinger's equation – application to a particle in a box.

UNIT V: ELCTRONICS

Basic Electronics: Junction Diode – LED – Zener diode – Voltage regulator – Junction transistor – Characteristics – Common base – common emitter mode – Transistor biasing - Amplifier (single stage)
DIGITAL ELECTRONICS:
 AND, OR, NOT gates – construction using diodes and transistors – NAND and NOR gates – Universal building Blocks. Boolean algebra – Demorgan's theorem – verification – elementary ideas of IC's – SSI, MSI, LSI and VLSI.

BOOKS FOR A STUDY AND REFERENCE:
1. **Allied physics** by Dr.K.Thankaraj and Dr.D.Jayaraman
2. **Text book of Optics** by Brijlal and Subramanian..
3. **Modern Physics** by R.Murugeshan S. Chand & Co.

4. **Physics, 4ᵗʰ Edition, Vols 1, 2 &2 Extended** by D.Halliday,R.Resnick and K.S.Krane, Wiley,NY,1994.
5. **Digital Principles and Application** – Malvino & Leach.
6. **Basic Electronics, 6ᵗʰ Edition** by Grob, McGraw-Hill, NY,1989.

ALLIED PHYSICS – PRACTICALS

(At the end of Second/Fourth Semester)

Time: 3 Hrs   Marks: 50

                                                      Internal: 20
                                                      External: 30

1. Young's modulus by non-uniform bending using Pin and microscope
2. Young's modulus by non-uniform bending using Optic lever – Scale and telescope
3. Rigidity modulus by Static torsion method.
4. Rigidity modulus by torsional oscillations.
5. Surface tension and interfacial torsion – Drop Weight method.
6. Comparison of viscosities two liquids – Burette method.
7. Specific heat Capacity of a Liquid – Half – Time correction.
8. Sonometer – A.C. Frequency.
9. Newton's rings Radius of curvature.
10. Air wedge – thickness of a wire.
11. Spectrometer – grating – wavelength of Hg lines.
12. Potentiometer – voltmeter calibration.
13. P.O.Box – Specific resistance.
14. B.G.- Figure of merit.
15. Construction of AND,OR,NOT gates – using diodes and Transistor.
16. Zener Diode – Characteristics.
17. NAND gate as a universal gate.

BOOKS FOR A STUDY AND REFERENCE:

1. **Allied Practical Physics** by M.N.Srinivasan,S.Chand and Co.
2. **Allied Practical Physics** by M.Arul Thalapathy, Comptek Publishers.

Question Paper Pattern for B.Sc. (Physics), Credit Cum Semester Pattern

Allied Papers (Maximum 60 Marks)

PART A (10x1=10 marks)
Answer all the questions.

Question #	Unit
1&2.	From Unit 1
3&4.	From Unit 2
5&6	From Unit 3
7&8	From Unit 4
9&10	From Unit 5

PART B (4x5=20 marks)

Answer any FOUR questions.

Question #	Unit
11.	From Unit 1
12.	From Unit 2
13.	From Unit 3
14.	From Unit 4
15.	From Unit 5

16.   From ANY Unit

PART C (3x 10=30 marks)

Answer any THREE Questions

Question #	Unit
17.	From Unit 1
18.	From Unit 2
19.	From Unit 3
20.	From Unit 4
21.	From Unit 5

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S.D.N.B. VAISHNAV COLLEGE FOR WOMEN
CHENNAI – 44

DEPARTMENT OF PHYSICS
SYLLABUS
II YEAR — MAJOR
III & IV SEMESTER

CORE PAPER III- SEMESTER III

P3-MECHANICS AND MATHEMATICAL METHODS

UNIT I: IMPULSE AND IMPACT

Impulse of a force – Newton's law of impact- coefficient of restitution– direct and oblique impact between two smooth spheres – Loss of Kinetic energy – reduced mass- Compound Pendulum – theory – equivalent simple pendulum – reversibility of centers of oscillation and Suspension – determination of g and k .

UNIT II: GRAVITATION, CENTRE OF GRAVITY AND CENTR OF PRESSURE

Newton's law of gravitation – Boy's method of determination of G – Kepler's laws – Orbital velocity and escape velocity – Geostationary and Communication Satellites. Centre of gravity of solid and hollow tetrahedron, solid and hollow hemispheres.Centre of pressure – vertical rectangular lamina – vertical triangular lamina - Equilibrium of bodies suspended and supported.

UNIT III: HYDRODYNAMICS

Equation of continuity of flow – Venturimeter – Pitot's tube for liquids – Euler's Equation for unidirectional flow – Torricelli's theorem – Bernoulli's theorem and Applications. Laws of floatation – metacentre – meta centric height of a ship.- Atmospheric pressure – its variations with altitude - reasons for such variations.

UNIT IV: CLASSICAL MECHANICS

Mechanics of a system of particles–constraints-Generalized coordinates–transformation Equations – configuration space – Principle of Virtual work – D' Alembert's Principle Lagrange's equation – Hamiltonian's Functions – Hamiltonian's Equations – applications to Harmonic Oscillator

UNIT V: MATHEMATICAL PHYSICS

Eigen values – eigen vectors – Cayley Hamilton theorem - Diagonalisation of 3x3 real Symmetric matrices. Beta and Gamma functions- Definition – Evaluation - Relation between Beta and Gamma functions – Series solution for Bessel Differential equation with derivation – Legendre, Hermite and Laguerre differential equations – solutions only (No derivations).

BOOKS FOR STUDY

1. **Mechanics** – Part I & II by Narayanamoorthy National Publishing Company.
2. **Classical Mechanics** – H. Goldstein, Addison Wesley Publications.
3. **Mathematical Physics** - Sathya Prakash.
4. **Statistical Mechanics** – Sathya prakash & C. Agarwal Kedarnath & Ramnath & Co., VII edition.

BOOKS FOR REFERENCE

1. **Mechanics** – D.S. Mathur – S.Chand & Co, II edition, 2001.
2. **Mathematical Physics** – B.D. Gupta.
3. **Advanced Engineering Mathematics** – VIII edition by Kreyszig.E, Wiley Publ. NY 1989.
4. **Mathematical Physics** by Ghatak A.K, Gayal I.C., Chaira S.G., Macmillan, New Delhi, 1995.
5. **Fundamentals of Physics**, VI edition by D. Halliday, R. Resnick and J. Walker, Wiley, NY, 2001
6. **Physics**, 4th edition, Vols. 1,2 & 2 Extended by D.Halliday, R.Resnick and K.S. Krane, Wiley, NY, 1994.
7. **The Feynman CRC Handbook of Physics & Chemistry**, 80th Ed., CRS Press, NY, 1999.
8. **Lectures on physics Vols, 1,2 & 3**, by R.P.Feynman, R.B.Leighton and M.Sands, Narosa, New Delhi, 1998.

CORE PAPER IV-   SEMESTER IV

P4- ELECTRICITY AND ELECTROMAGNETISM

UNIT I: DC CIRCUITS

Growth and decay of current in a circuit containing resistance and inductance. Growth and decay of charge in a circuit containing resistance and capacitor-growth and decay of charge in a LCR circuit-condition for the discharge to be oscillatory-frequency of oscillation-network analysis-Thevenin and Norton's Theorems.

UNIT II: ALTERNATING CURRENTS

Peak, average and RMS values of AC voltage and current– power factor and current values in an AC circuit containing LCR (reactance and impedance) series and parallel resonant circuits-power in AC circuits –wattless current – choke coil – construction and working of transformers – energy losses – AC motors – single phase, three phase- star and delta connections-electric fuses – circuit brakers.

UNIT III: MAGNETIC PROPERTIES OF MATERIALS

Susceptibility- permeability-intensity of magnetization and the relation $B=\mu_o(H+I_m)$-I-H and B-H curves for a magnetic material using magnetometer methods and ballistic galvanometer method. Terrestrial magnetism-magnetic elements-dip circle-Kew magnetometer-causes of earth's magnetic field.

UNIT IV: MAGNETIC EFFECT OF AN ELECTRIC CURRENT

Magnetic field around a current carrying conductor. Biot Savart's law- Magnetic field intensity at a point on the axis of a circular coil carrying current- magnetic field intensity due to a solenoid carrying current- effect of iron core in a solenoid- Helmholtz galvanometer- moving coil ballistic galvanometer- theory- damping correction. Determination of the absolute capacity of a condenser using B.G.

UNIT V: ELECTROMAGNETIC INDUCTION

Faraday's experiment on electromagnetism- Faraday's laws of electromagnetic induction-Lenz's law- Deduction of Faraday's law from Lorentz force- Vector potential. Eddy currents- inductors and inductance- determination of self-inductance of a coil using Anderson method- mutual inductance- experimental determination of absolute mutual inductance- coefficient of coupling.

BOOKS FOR STUDY:

1. **Electricity and Magnetism** by M.Narayanamurthy & N.Nagarathnam, National
   Publishing Company, revised edition)
2. **Electricity and Magnetism** by K.K.Tewari, S.Chand&Co., 3rdEdition, 2001.

BOOKS FOR REFERENCE

1. **Electricity and Magnetism** by Brijlal &Subramanian
2. **Electricity and Magnetism** by D.Chattopadhyay, books & Allied publications
3. **Textbook for Applied electronics** by R.S.Sedha S.Chand&co, New Delhi, 2002.
4. **Fundamentals of physics, 6thEdition**,by D.Halliday, R.Resnick and J.Walker, WILEY,
    NY 2001.
5. **Physics, 4thEdition,Vols1, 2 &2 Extended** by D.Halliday, R.Resnick and K.S.Krane,
   WILEY NY 1994.
6. **CRC Handbook of physics & Chemistry**, 80thED., CRS Press, NY,1999.
7. **The Feynman Lectures on physics, Vols.1, 2,and 3**,by R.P.Feynman, R B Leighton
   and   M.Sands,Narosa, NewDelhi, 1998.
8. **Basic Electronics, 6thEdition** by B.Grob, McGraw-Hill, NY, 1989.

CORE PRACTICAL- (PH 4)

(At the end of fourth semester)

Time: 3 hrs   **Marks: 100**

Internal: 40

External: 60

1. Young's Modulus-Cantilever-Depression-(Static method)-(scale and Telescope)
2. Young's Modulus-Cantilever oscillations-(Dynamic method)
3. Rigidity Modulus-Static torsion
4. Compound pendulum-g and k
5. Sonometer-A.C. frequency-Steel wire.
6. Melde's string-Frequency,R.D. of a solid and liquid.
7. Speicific heat capacity-Joule's calorimeter-half-time correction.
8. Thermal conductivity of a bad conductor-Lee's disc method.
9. Spectrometer-μ of a glass prism i-d curve.
10. Spectrometer-grating N and λ -Normal incidence method.
11. Spectrometer-grating N and λ-Minimum deviation method.
12. Air wedge-thickness of a wire.
13. m and B_H-Deflection magnetometer Tan C position and Vibration magnetometer.
14. B_H-by Copper Voltmeter and Tangent Galvanometer.
15. Carey Foster Bridge-Temperature coefficient of resistance.
16. Potentiometer-Ammeter Caliberation.
17. Potentiometer-Resistance and Specific resistance of wire
18. Figure of merit of galvanometer (Mirror Galvanometer Or Table Galvanometer).

- Note : use of digital balance is permitted.

Question Paper Pattern for B.Sc.Physics, Credit cum Semester Pattern

A: Core Papers(Maximum 75 Marks):

PART A(10x 2=20 marks)
Answer all the questions.

Question #	Unit
1&2	From Unit 1
3&4	From Unit 2
5&6	From Unit 3
7&8	From Unit 4
9&10	From Unit 5

PART B(5x5=25 marks)
Answer any FIVE Questions.

Question #	Unit
23.	From Unit 1
24.	From Unit 2
25.	From Unit 3
26.	From Unit 4
27.	From Unit 5
28.	From ANY Unit
29.	**Problem** from any Unit(s)

PART C(3x10=30 marks)
Answer any three questions

Question #	Unit
30.	From Unit 1
31.	From Unit 2
32.	From Unit 3
33.	From Unit 4
34.	From Unit 5

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S.D.N.B. VAISHNAV COLLEGE FOR WOMEN
CHENNAI – 44

DEPARTMENT OF PHYSICS
SYLLABUS
III YEAR
V&VI Semester

UNIT I: GEOMETRICAL OPTICS

Cardinal points in lenses- Spherical aberration in lenses– Methods of minimizing Spherical aberration – condition for minimum spherical aberration in the case of two lenses separated by a distance – Chromatic aberration in lenses – condition for achromatism of two thin lenses (in contact and out of contact) – coma . – Huygen's and Ramsden's eye pieces .

UNIT II:DISPERSION

Dispersion produced by a thin prism-Angular dispersion-dispersive power-Cauchy's formula –combination of prisms to produce-dispersion without deviation-deviation without dispersion-Achromatic prisms-Direct vision spectroscope-rainbow and haloes.

UNIT III: INTERFERENCE

Colours of thin films-Airwedge-Determination of diameter of thin wire by air wedge-Test for optical flatness –Haidinger's fringes – Michelson's interferometer – theory – applications - λ , thickness of thin transparent material and resolution of spectral lines – Brewster's fringes – Refractive index of gases – Jamin's and Rayleigh's interferometers-Stationary waves in light-Colour photography(principle only)

. UNIT IV: DIFFRACTION
Fresnel's diffraction – diffraction at Straight edge and Narrow wire – Fraunhoffer diffraction - Single slit – Double slit – plane diffraction grating – theory and experiment to determine wavelength – normal incidence – oblique incidence Missing orders and overlapping spectra– Rayleigh's criterian for Resolution – Resolving power of microscope, Telescope, prism and grating.

UNITV: POLARISATION

Double refraction-nicol prism-polarizer and analyzer-Huygen's explanation of double refraction in uniaxial crystals – Dichroism – Polaroid and their uses– Double image polarizing prisms oubl– quarter wave and half wave plate – plane, elliptically and circularly polarized light – production and detection – Babinet's compensator – Optical activity – Fresnel's explanation of optical activity – specific rotatory power – determination using Laurent's Half shade Polarimeter.

BOOKS FOR STUDY:

1. **A textbook of optics** – Brijlal and Subramanian.
2. **Optics** – Ajoy Gatak
3. **Optics** – Khanna and Gulati
4. **Optics and Spectroscopy by Murugeshan**, S.Chand & Co., Pvt Ltd., New Delhi.

BOOKS FOR REFERENCE:

1. **A text book of light**- by Vasudeva.
2. **A guide to laser** – David Fishlock.
3. **Fundamentals of Optics** by Jenkins A Francis and White E. Harvey, McGraw Hill Inc., New Delhi, 1976.
4. **Optical Physics** by Lipson. S.G., Lipson H., and Tannhauser D.S., Cambridge University Press, (1995)
5. **Fundamentals of optics** by Raj M.G., Anmol Publications Pvt., Ltd., (1996), New Delhi.
6. **Fundamentals of physics**, 6th edition , by D.Halliday, R.Resnick and J.Walker, Wiley, NY, 2001.
7. **Physics, 4th edition**, Vols 1,2 & 2 extended by D.Halliday, R.Resnick and K.S.Krane, Wiley, NY, 1994.
8. **CRC Handbook of physics and chemistry**, 80th Ed., CRS Press, NY, 1999.
9. **The Feynman Lectures on Physics, Vols 1, 2 & 3** by R.P.Feynman, R.B.Leighton and M Sands, Narosa, New Delhi, 1998.

CORE PAPER V SEMESTER V

P6-BASICS OF NANOSCIENCE

UNIT 1:INTRODUCTION TO NANOTECHNOLOGY

Introduction to Nano structured Materials – Size dependent property of Nano structures-types of bonds- Covalent- Coordinate – Vanderwaal's and hydrogen bonds-formation of covalent bonds(Q.M.Treatment)- polymers – Ceramics- Biosystems- Molecular recognition- Different forms of nanostructures – nanotubes – nanorods – Belts&Combs.

UNIT II: TOOLS OF THE NANOSCIENCE

Bragg's X-ray diffractometer- Atomic force Microscope – Scanning Electron microscope – Tranmission Electron microscope - Nanosphere lithography- Nano CAD.

UNIT III: NANOSCALE CRYSTAL GROWTH

Introduction-Nucleation Kinetics, Gibbs free energy, Synthesis of bulk nano – Structured materials top down and bottom up approaches.
CVD technique - defects & characteristization of crystals.

UNIT IV: BASICS OF NANOELECTRONICS

Introduction to Semiconductor nano devices –FPGA, Nanoeye, Nanoclock, Nano laser, Nano skin (Definition only)-Quantum dot: Production & applications, Nano MOSFET-single electron transistor-spintronix-molecular electronics – sensors.

UNIT V: NANOSCIENCE IN HEALTH CARE

Introduction to Nano Biology-Biological Imaging-Immuno flurescent Biomarker Imaging-Immunogold labeling-Diagnostic applications of Immuno targeted nano particles-Targeted Drug Delivery- Materials for use in diagnostic & therapeutic applications: Gold Nano particle, Quantum dot and Magnetic nano particle.

BOOKS FOR STUDY AND REFERENCE:

1. Nanotechnology – Mark Ratner, Daniel Ratner.
2. A handbook on Nanoelectronics – Branda Paz.
3. Nano: The Essentials – T.Pradeep.
4. Science and Technology of Nano materials – M.Balakrishna Rao & Krishna Reddy.

CORE PAPER VII- SEMESTER V

P7-ATOMIC PHYSICS AND NUCLEAR PHYSICS

UNIT I: PHOTO ELECTRICITY

Photoelectric emission-laws-Lenard's experiment-Richardson and Compton experiment-Einstein's photoelectric equation-experimental verification of Einstein's photoelectric equation by Millikan's experiment-Photoelectric cells.

UNIT II: FINE STRUCTURE OF SPECTRAL LINES

Spectral terms and notations-selection rules-intensity rules and interval rule-fine structure of sodium D lines-alkali spectra-fine structure alkali spectra- spectrum of Helium-Zeeman effect-Larmor's theorem-Debye's explanation of normal Zeeman Effect. Anamalous Zeeman effect-theoretical explanation. Lande's 'g' factor and explanation of splitting of D1 and D2 lines of sodium.

UNIT III: RADIOACTIVITY

Natural Radioactivity-Half –Life period and decay constant-Transient and secular equilibrium-Radio carbon dating-Age of the earth-Characteristics of Alpha and Beta ray spectra-Geiger-Nuttal law-Gamow's theory of alpha decay-Neutrino theory of beta decay-Gamma rays and internal conversions-Nuclear isomerism.

UNIT IV: RADIATION DETECTORS AND PARTICLE ACCELERATORS

Binding energy-Liquid drop model and semi empirical mass formula. Radiation detectors-Ionisation chambers-Geiger-Muller counter-Scintillation counter-Wilson's cloud chamber-Bubble chamber-Photo emulsion techniques-Particle accelerators-Linear accelerators-Cyclotron-Synchro cyclotron-Betatron.

UNIT V: ELEMENTARY PARTICLES AND NUCLEAR REACTIONS

Nuclear Fission-Chain reaction-Critical Mass-Controlled chain reaction-Nuclear Reactors-Thermo Nuclear Reaction-Source of Stellar energy. Cosmic rays-origin-nature of cosmic rays-latitude effects-east-west asymmetry-altitude effect-Seasonal and diurnal changes-Cosmic rays showers and bursts-Primary and Secondary Cosmic rays-Van Allen Radiation belt. Basic ideas about Elementary particles-Hadrons-Leptons-Mesons-Baryons-Hyperons-Anti particle and antimatter-Classification of elementary particles-Strangeness-Isospin.

BOOKS FOR STUDY:

1. **Modern Physics** by R. Murugeshan, S. Chand&co.
2. **Atomic and Nuclear Physics** by Littlefeld and Thorley**.**
3. **Modern Physics** by Sehgal and Chopra.

BOOKS FOR REFERENCE:

1. **Atomic Physics** by J. B. Rajam.
2. **Atomic and Nuclear Physics** by N. Subramaniam and Brij Lal, S. Chand & co, 5thEdition, 2000.
3. **Atomic Physics** by A.B. Gupta and Dipak Ghosh- Books and allied publishers.
4. **Concepts of Modern Physics** by A. Beiser, Tata McGraw-Hill, New Delhi, 1997.
5. **Nuclear Physics** by Irving Kaplan.
6. **Nuclear Physics** by L.R.B. Elton .
7. **Nuclear Physics** by J.B.Rajam, S. Chand&co.
8. **Perspectives of Modern Physics** by Beiser, McGraw Hill.
9. **Introduction to Nuclear Physics** by Herald Enge, Addison Wesley.
10. **Introduction to Nuclear Physics** by S.B. Patel, Tata Mc Graw Hill.
11. **Fundamentals of Physics** ,6th edition, by D. Halliday, R. Resnick and J. Walker, Wiley, NY, 2001.
12. **Physics, 4th edition, Vols 1,2&2 extended** by D. Halliday, R, Resnick and K.S. Krane, Wilsey , NY, 1994.
13. **CRC Handbook of Physics and Chemistry**, 80th edition, CRS Press, NY, 1999.
14. **The Feynman Lectures on Physics**, Vols1, 2, and3, by R.P. Feynman, R.B. Leighton and M Sands, Narosa, New Delhi, 1998.

CORE PAPER VIII-SEMESTER – V
P8 SOLIDSTATE PHYSICS AND SEMI CONDUCTOR DEVICES

UNIT I: CRYSTAL STRUCTURE

Crystal Lattice-Primitive and Unit cell-Seven classes of crystals-Bravais Lattice-Miller Indices-Structure of Crystals-Simple cubic, Hexagonal closed packed structure, Face centered cubic structure, Body centered cubic structure, Simple cubic structure, Sodium Chloride structure, Zinc Blend structure, Diamond structure

UNIT II: DIFFRACTION OF X-RAYS BY CRYSTALS

Diffraction of X-Rays by crystals-Bragg's Law in one Dimension –Experimental Method in X-Ray Diffraction-Laue method, Rotating Crystal method-Powder Photograph method-Von Laue's equations.

UNIT III: MAGNETIC PROPERTIES

Different type of Magnetic materials-Classical theory of Diamagnetism (Langevin's theory)-Langevin's theory of Para magnetism-Weiss Theory of Para magnetism-Qualitative Explanation of Heisenberg's internal field and Quantum theory of Ferromagnetism.

UNIT IV: DIELECTRIC PROPERTIES

Fundamental Definitions in Dielectrics-Different types electric polarization-Frequency and temperature effects on polarization-Dielectric loss-Local field on internal field clausius-Mosotti Relation-Determination of Dielectric constants. .

UNITV: SEMICONDUCTOR DEVICES

Special Semi conductor devices–Field effect Transistor(FET),Uni-junction Transistor(UJT), Silicon Controlled Rectifier(SCR) construction, characteristics and working-FET amplifier-UJT relaxation oscillator-Firing of SCR using UJT-SCR as a Switch –SCR rectifier Photo diode and photo transistor-uses-LDR-uses.

BOOKS FOR STUDY:

1. **Solid state physics by P.K. Palanisamy,**
2. **Material Science by M. Arumugam**, Anuradha Publishers.
3. **Material Science and Engineering** by V. Raghavan, PHI.
4. **Modern Physics** by R. Murugasen
5. **Applied Electronics by A Subramaniyam, The National publishing company chennai**
6. **Integrated Electronics by V.Vijayendran.**

BOOKS FOR REFERENCE:

7. **Material Science and Engineering** by V. Raghavan, PHI.
8. **Introduction to Solids** by Azaroff, TMH.
9. **Concepts of Modern Physics** by Beiser, Tata Mc. Graw Hill, 5th Edition, 1997.
10. **Solid State Physics** by J. Dekker, Macmillan India Ltd.
11. **Fundamentals of Physics,6th Edition**, by D. Halliday, R. Resnick and J. Walker, Wiley, NY, 2001.
12. **Physics,4th edition, Vols 1,2, &2 extended** by D. Halliday, R. Resnick, and K.S. Krane, Wiley, NY,1994.
13. **CRC Handbook of Physics and Chemistry**, 80th edition, CRS Press, NY, 1999.
14. **The Feynman Lectures on Physics, Vols 1,2, and3**, by R.P. Feynman, R.B. Leighton and M Sands, Narosa, New Delhi, 1998.
15. **Introductory Solid State Physics** by H.P. Mytrs, Viva Books, New Delhi, 1998.
16. **Elementary Solid State Physics** by M.A. Omar, Pearson Education, 2002.
17. **Introduction to Solid State Physics** by Kittel, Wiley and Sons,7th Edition.
18. **solid state physics by S.O.Pillai**
19. **Elements of Crystallography by prof.D.Velmurugan**
20. **Integrated Electronics by Millman and Halkias**
21. **Integrated Electronics by Malvino and Leach**

SEMESTER – V   ELECTIVE I
NUMERICAL METHODS

Unit 1 : Simultaneous Linear Algebraic Equations

Method of triangularisation - Gauss elimination method - Inverse of a matrix - Gauss - Jordan method

Unit 2 : Numerical Solution of Algebraic, Transcendental and Differential Equation

Bisection method – Regula falsi method - Newton - Raphson method - - Horner's method - Solution of ordinary differential equation - Euler's method– concept of operators – relation between operators

Unit 3 : Interpolation

Finite differences–linear interpolation – interpolation with equal intervals – Newton forward interpolation formula – Newton backward interpolation formula.

Unit 4 : Curve Fitting

Principles of least squares - fitting a straight line - linear regression - fitting an exponential curve.

Unit 5 : Numerical Integration

Trapezoidal Rule - Simpson's 1/3 rule.

Books for Study
   1. Numerical methods – B.D. Gupta Konark Publishers Pvt.Ltd,(2003)
   2. Numerical methods by V.Rajaraman,Prentice-Hall India Pvt.Ltd.,(2003
   3. Numerical methods- M.K.Venkatraman, National Publishing Company, (1990).
   4. Numerical methods by P. Kandasamy, K. Thilagavathy and K. Gunavathy,
        S.Chand & Co. (2002).

Web Site
       http://www.sst.ph.ic.ac.uk/angur/lectures/compphys/compphys.html.
       http://www.library.cornell.edu/nn/(Numerical receipier online book in C & Fortran).

CORE PAPER IX- SEMESTER VI
P9-SPECTROSCOPY AND LASER PHYSICS

UNIT I: Introduction to Spectroscopy and Microwave Spectroscopy

Characterisation of electromagnetic radiation-Quantization of energy-Regions of the spectrum-Basicelements of practical spectroscopy-Width of spectral lines-Intensity of spectral lines-.Rotation of molecules-Rotational spectra -The rigid Diatomic molecule-The intensities of spectral lines –Techniques and Instrumentation (outline)

UNIT II:Infrared Spectroscopy

The energy of a Diatomic molecule- The simple harmonic oscillator –the Diatomic vibrating rotator-vibration –the rotation spectrum of carbon monoxide –Breakdown of the Born-Oppenheimeer Approximation:The interaction of rotations and vibrations-Techniques and Instrumentation(Outline)

UNIT III:Raman Spectroscopy

Quantum theory of Raman effect-Molecular polarizability-Pure rotational Raman spectra of linear molecules –Vibrational Raman spectra-Structure determination from Raman and Infrared spectroscopy-Techniques and Instrumentation(outline)

UNIT IV: Laser Theory

Absorption –spontaneous emission –stimulated emission-Einstein's coefficients-threshold conditionfor laser action –properties of lasers.
Resonators-Vibrational modes of resonators, number of modes /unit volume-Open resonators, control resonators. Q factor, Losses in the cavity, Threshold condition, Quantum yield

UNIT V: Applications of Lasers and Holography

Applications of Lasers in communication, Industry and medicine –Holography: Recording –Theory Of reconstruction of images – Characteristics of a hologram -Classification of hologram-Comparison with conventional photography-Practical application of hologram- Holographic Optica Element (HOE).

BOOKS FOR STUDY
1. Fundamentals of Molecular Spectr oscopy by Banwell C.N & Mc Cagh, Tata Mc Graw Hill Publishing Co Ltd., IV Edition, New Delhi, 1994.
2. Laser and Non-Linear optics by Laud B.B., Wiley Easter Ltd., NY,1985.
3.An introduction to Lasers, theory and applications by Avadhunulu M.N.,S.Chand & Co., New Delhi,2001.

BOOKS FOR REFERENCE
1. Basic Principles of Spectroscopy by Chang Raymond, Mc Graw Hill Publishing Co.Ltd,New Delhi,1971.
2. Elements of Spectroscopy by Gupta S.L.,Kumar V.,Sharma .R.C.,Pragathi Prakashan,Meerut,1980.
3. Introduction to Molecular Spectroscopy by Barrow G.M.,Mc Graw Hill,Kogakusha Ltd., Tokyo,1962.
4. Spectrosocopy by Strughen & Walker, Chapmen&Hill Publishing Co.Ltd.,
5. Opto Electronics-An introduction by Wilson J.& Hawkers J.F.B,Prentice Hall,NY,1987.
6. Optical Electronics by Ajoy Ghatak&Thiagarahan,Cambridge University press 1991.
7. Semiconductor Optp Electronics by Prof.P.K.Palaniswamy, Scitech Publishing Co.Ltd
8. Optical Electronics by Ajoy Ghatak and Thiagarajan, Cambridge Univeristy Press, 1991

CORE PAPER X SEMESTER VI
P10- RELATIVITY AND QUANTUM MECHANICS

UNIT I: RELATIVITY

Frame of reference- Gallilean transformation-Michelson-Moreley experiment-Postulates of special theory of relativity-Lorentz transformation-Length contraction- Time dilation-Relativity of simultaneity-addition of velocities-variation of mass with velocity-mass energy equation-Minkowski's four dimensional space-Space time continuum-Four vectors-Elementary ideas of general theory of relativity.

UNIT II: WAVE NATURE OF MATTER

Phase and group velocity-Wave packet-Expression for De Broglie wavelength-Davisson and Germer's experiment-G.P. Thomson's experiment-Electron microscope-Heisenberg's uncertainty principle-its consequences.

UNIT III: SCHRODINGER"S EQUATIONS

Inadequacy of Classical Mechanics-Basic postulates of Wave mechanics-Schrodinger's equation-properties of wave function-operator formalism-Linear operators-Self-Adjoint operators-Expectation value-Eigen value- Eigen values and Eigen functions-Commutativity and Compatibility.

UNIT IV: APPLICATION OF SCHRODINGER'S EQUATIONS

Free particle solution of Schrodinger's equation-particle in a box-Qualitative treatment(outlining steps only) of the Barrier penetration problem, Linear harmonic oscillator, Rigid rotator and Hydrogen atoms.

UNIT V: SCATTERING THEORY

Scattering process-Differential and total cross section-Scattering amplitude-Centre of mass frame-Laboratory frame-Reduced mass-Transformation from C.M. frame to laboratory frame-reduction of two body problem into one body problem.

BOOKS FOR STUDY:

1. **Modern Physics** by R. Murugeshan, S.Chand&co.
2. **Quantum Mechanics** by V.K. Thangappan, Wiley Eastern.
3. **A Text Book Quantum Mechanics** by P.M. Mathews and Venkatesan McGraw Hill.

BOOKS FOR REFERENCE:

1. **Quantum Mechanics** by Ghatak and S.Loganathan, Macmillan.
2. **Introduction to Quantum mechanics** by Pauling and Wilson, McGraw Hill.
3. **Quantum Mechanics** by NordeineZettili, John Wiley, 2001.
4. **Basic Quantum Mechanics** by A. Ghatak,Macmillan, India,2002.
5. **Fundamentals of Physics ,6th edition**, by D. Halliday, R.Resnick and J. Walker, Wiley,NY, 2001.
6. **Physics,4th edition, Vols1,2,&2 extended** by D. Halliday, R.Resnick and K.S. Krane,Wiley,NY, 1994.
7. **CRC Handbook of Physics &Chemistry,80th edition**,CRS Press,NY,1999.
8. **The Feynman Lectures on Physics, Vols 1,2 and3**, by R.P. Feynman, R.B. Leighton and M Sands, Narosa, New Delhi, 1998.
9. **Concepts of Modern Physics ,5th edition** by A.Beiser, Tata McGraw Hill,1997.
10. **Seven wonders of Cosmos by J.Narlikar**, Cambridge University Press.
11. **After the First 3 Minutes** by T.Padmanabhan,Cambridge University Press.

P11- COMPUTER PROGRAMMING-C LANGUAGE

UNIT I: INTRODUCTION

Importance of C-Basic structure of C Programs-Programming style. Constants, Variables and Data types:-Character set, Key words and Identifiers-Constants-Variables-Data types-Declaration of variables-Assigning values of variables.
Operators and Expression:
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, goto, break and continue statements, while, do while, for statements.
Arrays:One-dimensional and two-dimensional arrays, declaring arrays, storing arrays in memory-initialising arrays**.**

UNIT III: FUNCTIONS

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

UNIT IV: POINTERS

Pointers and functions-arguments-pointers and arrays-address arithmetic-character pointers and functions-Pointer arrays-Point on Pointers.
Pre-Processor:Macro substitution-File inclusion-Compiler control directives-opening and closing a files-reading and writing data-error handling-Random Access.

UNIT V: DEVELOPMENT OF ALGORITHM,FLOWCHART AND PROGRAMS FOR FOLLOWING PROBLEMS

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 elements in an array.
7. Sorting a set of numbers in ascending / descending order.
8. To arrange the names in alphabetical order.
9. Numerical integration by Trapezoidal/Simpson's rule.
10. Determination of roots b Newton-Raphson method.

BOOKS FOR STUDY:
1 .Programming in ANSI C **by E. Balagurusamy, Tata McGraw- Hill.**
2. Schaum's Outline Series-Theory and Problems of programming with C **by Byron S, Gottfried, McGraw Fill Internationals.**
3. Programming with C **by Venugopal, K.R. and Sudep R.P., Tata McGraw Hill, 1998.**
4. Teach Yourself C **by Herbert Sehildt, Osborne, McGraw Hill.**

SEMESTER VI
ELECTIVE II INTEGRATED ELECTRONICS

UNIT 1: FUNDAMENTAL DIGITAL ELECTRONICS

Introduction to Logic circuits– simplification of logic circuits - using (i) Boolean algebra, (ii) Karnaugh map – Demorgan's theorems - NAND and NOR as universal building blocks.

UNIT 2 : COMBINATIONAL LOGIC CIRCUITS

Half adder, full adder, half subtractor and full subtractor – 4 bit adder/subtractor - decoder, encoder - multiplexer - demultiplexer.

UNIT 3 : SEQUENTIAL LOGIC CIRCUITS

R.S flip flop, D flip flop and JK flip flops - JK Master Slave flip flop - synchronous and ripple counters - BCD counter – Up/Down counters - shift registers - serial and parallel registers - ring and twisted ring counter.

UNIT 4 : OP-AMP BASIC APPLICATIONS

Characteristics parameters – differential gain – CMRR – Slew rate – bandwidth - applications – inverter, non-inverter, integrator, differentiator, summing, & difference - averaging amplifier - solving simultaneous equations - comparator - Wien's bridge oscillator

UNIT 5: TIMER DAC/ADC

Timer 555 - Internal block diagram and working - astable multivibrator - schmitt trigger.
D/A converter - binary weighted method - A/D converter - successive approximation method.

Books for Study

1. Digital Principles and Application by Malvino Leach, Tata McGraw Hill, 4th Edition(1992).
2. Digital Fundamentals by Thomas L. Floyd, Universal Book Stall, New Delhi(1998).
3. Introduction to Integrated Electronics by V.Vijayendran, S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai(2005).
4. OP - AMPs and Linear Integrated Circuits by Ramakant A. Gayakwad, Prentice Hall of India(1994).

Books for Reference

1. Digital Electronics by Practice Using Integrated Circuits - R.P.Jain - Tata McGraw Hill(1996).
2. Linear Integrated Circuits by D. Roy Choudhury and Shail Jain - New Age International (P) Ltd.(2003).
3. Electronics - Analog and Digital by I.J. Nagrath - Prentice - Hall of India, New Delhi(1999).
4. Integrated Electronics by J.Millman and C.Halkias, Tata McGraw Hill, New Delhi (2001)

Web Site

http://www.dear.harward.edu/courses/es154.
http://www.phys.ualberta.ca/~gingrich/phys395/notes/phys395.html.

ELECTIVEIII MICROPROCESSOR FUNDAMENTALS

UNIT I: ARCHITECTURE

Architecture of 8085 microprocessor, registers, flags, ALU-Address bus and data bus-Demultiplexing address/data bus-control and status signals-Control bus-Programmer's model of 8085-Pin-out signal function diagram-Functions of different pins.

UNIT II: INSTRUCTION SET

Instruction set of 8085-data transfer, arithmetic, logic, branching and machine control group of instructions-Addressing modes-register, register indirect, direct, and immediate and implied addressing modes.
Assembly language and machine language-Programming exercises-addition, subtraction, Multiplication and division (all 8-bit binary), ascending order/descending order.

UNIT III:INTERFACE
Memory interface-Interfacing 2Kx8 ROM and RAM interface-Timing diagram of 8085 instructions(MOV Rd, Rs-MVI data8)

UNIT IV:INTERFACING I/O PORTS, PERIPHERALS

Interfacing input port and output port to 8085-Programmable peripheral interface 8255-Flashing LEDs.

UNIT V:INTERRUPTS

Interrupts in 8085-hardware and software interrupts-RIM, SIM instructions-priorities.
Simple-polled and interrupt controlled data transfer.

BOOKS FOR STUDY:

1. **Microprocessor Architecture Programming and Application with 8085/8080A** by Ramesh Gaonkar, Wiley Eastern.
2. **Fundamentals of Microprocessor 8085** by V. Vijayendran, S.Viswanathan publishers, Chennai.

BOOKS FOR REFERENCE:
1. **Introduction to Microprocessors** by Adithya Mathur
2. **Introduction to Microprocessors** by Lance A. Levanthal.

CORE PRACTICALS III
(At the end of VI semester)

Time: 3hrs   **Marks: 75**

Internal:30

External:45

1. Young's Modulus-Koenig's method- Non-uniform bending..
2. Newton's rings-R_1,R_2 and 'μ' of the convex lens.
3. Spectrometer- i-i ' curve.
4. Spectrometer-Cauchy's constants.
5. Spectrometer-Narrow angled prism.
6. Field along the axis of a circular coil-Deflection magnetometer-B_H and M.
7. Field along the axis of a circular coil-Vibration Magnetic needle-B_H.
8. EMF of a thermocouple-Mirror galvanometer(or table galvanometer)
9. Potentiometer-EMF of a thermocouple
10. Potentiometer-Caliberation of high range voltmeter.
11. Conversion of a milli ammeter into a voltmeter & ammeter of various ranges and ohmmeter.
12. B.G.-Figure of merit(for charge)
13. B.G.-Comparison of capacitances.
14. B.G.-Absolute capacitance of a capacitor.
15. B.G.-Comparison of mutual inductances.
16. B.G.-Absolute mutual inductance.
17. B.G.-Comparisons of EMFs.
18. B.G.-Internal resistance of a cell.
- Note: Use of Digital balance permitted.

BOOKS FOR STUDY AND REFERECES:

1. **A Laboratory manual of Physics for U.G. Courses** by B.P. Khandalwal.
2. **Advanced Practical Physics** by Worsnop and Flint.
3. **A Text Book of Practical Physics** by M.N Srinivasan, S. Chand&co.
4. **Practical Physics** by M. Arul Thalapathi, Comptek publishers.

CORE PRACTICAL IV
(At the end of VI th Semester)

Time:3hrs   **Marks: 75**

Internal:30

External:45

ANY SIXTEEN EXPERIMENTS

1. Bridge rectifier-Zener regulator power supply-9V-Regulating characteristics.
2. Single stage amplifier-gain and frequency response
3. Emitter follower.
4. Amplifier with feedback.
5. Harley Oscillator
6. Colpitt's Oscillator
7. Phase shift Oscillator
8. Wien's bridge Oscillator
9. Clipping and Clamping circuits.
10. Differentiating and Integrating circuits.
11. Transistor-astable multivibrator.
12. OpAmp-inverting amplifier,Non-inverting amplifier and unity follower.
13. FET characteristics
14. FET amplifier
15. UJT characteristics
16. UJT relaxation oscillator
17. SCR characteristics
18. NAND/NOR as universal gates.
19. Half adder and Full adder.
20. Half subtractor and Full subtractor.
21. Study of Multiplexers and Demultiplexers.
22. 4-bit ripple counter using 7473/7476
23. 4-bit shift register using 7473/7476
24. Decade counter 7490.

CORE PRACTICAL V
(At The End of VI Semester)

Time: 3hrs   **Marks: 50**
                                                                Internal: 20
                                                                External: 30

ANY FIFTEEN EXPERIMENTS

1.   Microprocessor – 8085 – 8 bit Addition

2.   Microprocessor – 8085 – 8 bit Subtraction

3.   Microprocessor – 8085 – 8 bit Multiplication

4.   Microprocessor – 8085 – 8 bit Division

5.   Microprocessor – 8085 – Addition of N Number of single byte numbers

6.   Microprocessor – 8085 – Sorting of given set of numbers in

        ascending order

7.   Microprocessor – 8085 – Sorting of given set of numbers in

        descending order

8.   Microprocessor – 8085 – Finding the largest no. in a given set of numbers.

9.   Microprocessor– 8085–Finding the smallest no. in a given set of numbers.

10.   Op amp 741 - Inverting , Non - Inverting amplifier, unity follower.

11.   Op amp 741 - Summing and difference amplifier

12.   Op amp 741 – Differentiator, integrator

13.   OP amp 741 – Solving simultaneous equations

14.   Op amp 741 – Wein's Bridge oscillator

15.   Op amp 741 - Phase Shift oscillator

16.   555 - Timer - Schmitt Trigger

17.   555 - Timer - Astable operation

18.   555 - Timer - Monostable

19.   D/A Converter – 4 bit, binary weighted resistor method

Books for the Study & Reference :

1.   Practical Physics by D. Chattopadhyay, P.C. Rakshit, New Central Book Agency (p) Ltd. Kolkata(2007).
2.   Practical Physics and Electronics by C.C.Ouseph, U.J.Rao and Vijayendran, S.Viswanathan (Printers & Publishers) Pvt., Ltd (2007).
3.   Practical Physics by C L Arora, S. Chand & Co., New Delhi (2008)

Question Paper Pattern for B.Sc.Physics, Credit cum Semester Pattern

A: Core Papers(Maximum 75 Marks):

PART A(10x 2=20 marks)
Answer all the questions.

Question #	Unit
1&2	From Unit 1
3&4	From Unit 2
5&6	From Unit 3
7&8	From Unit 4
9&10	From Unit 5

PART B(5x5=25 marks)
Answer any FIVE Questions.

Question #	Unit
35.	From Unit 1
36.	From Unit 2
37.	From Unit 3
38.	From Unit 4
39.	From Unit 5
40.	From ANY Unit
41.	**Problem** from any Unit(s)

PART C(3x10=30 marks)
Answer any three questions

Question #   **Unit**

42.   From Unit 1

43.   From Unit 2

44.   From Unit 3

45.   From Unit 4

46.   From Unit 5

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PAPER I - SOLAR ENERGY UTILISATION

UNIT I :

Solar thermal power generation –Power plant system –Solar farms – Biological conversion of solar energy –Photo Biological effects – Biochemical fuel cell.

UNIT II :

Solar Pumping –Solar Diastillation –Basic types of solar <u>still</u> –Solar production of Hydrogen –Different methods –Application of solar energy in space.

UNIT III :

Photo-voltaic cell-Solar pond –Indian research on Solar energy utilisation.

BOOKS FOR STUDY

1. **Solar energy utilizatoin** by **G.D.Rai**

PAPER II

BASIC APPLIED MEDICAL PHYSICS

UNIT-1: Introduction to ECG and Ultrasound Therapy

Functions and uses of ECG-Applications of ultrasonics in medical field-Principle of Tomography(CAT)&Magnetic Resonance Image

UNIT-2: Physiotherapy

Basic ideas of Pulley and Lever-Action Potentials-Uses of Physiotherapy instruments

UNIT-3: Field Visit to Hospital

BOOKS FOR STUDY:

Fundamentals of Physics by Resnick and Halliday
http://en.wikipedia.org
http://isiconlina.org