DEPARTMENT OF PHYSICS

REGULATIONS, CURRICULUM AND SYLLABUS (AUTONOMOUS)

BACHELOR OF SCIENCE IN PHYSICS

1. ELIGIBILITY FOR ADMISSION TO THE COURSE

a. A pass in the higher secondary examination of the Government of Tamilnadu or any other qualification equivalent to this as approved by the University of Madras.

b. Subject Requirement: Physics, Chemistry and Mathematics.

2. EXAMINATIONS:

All odd semester examinations will be held in November and all even semesters in April.

3. EVALUATION: THEORY

a) Internal marks	**15**
External marks	**60**
Total	**75**
<u>Internal mark distribution:</u>	
Tests	**9 marks**
Seminar	**3 marks**
Objective type Question	**3 marks**
Total	**15 marks**
b) Allied Paper	
External marks	**60**
Internal marks	**15**
Total	**75**

Internal Mark distribution:

Tests	**9 marks**
Seminar	**3 marks**
Objective type Question	**3 marks**
Total	**15 marks**

Internal Mark distribution: (Elective)

Tests	**15 marks**
Seminar	**5 marks**
Objective type Question	**5 marks**
Total	**25 marks**

Break-up of Internal Marks for Practical

a. **Internal marks : 20**

Test (Best 2)	**10 marks**
Record	**10 marks**

b. **Internal marks : 40**

Test (Best 3)	**30 marks**
Record	**10 marks**

4. **WORKING DAYS: 90 days / 450 hours for each semester.**

CHOICE BASED CREDIT SYSTEM

B.Sc.Physics

Study Components	No. of Papers	Credit Per Paper	Total Credit
Part I (Tamil/Hindi/Sanskrit)	4	3	12
Part II (English)	4	3	12
Part III :			
Core Major : Theory	16	3	48
Practical	4	2 or 4	12 (2x2+2x4)
Core Elective: Theory	2	5	15 (2x5+1x5)
Practical	1	5	
Core Allied:			
I-Chemistry Theory	2	4	8
Practical	1	2	2
II-Maths Theory	2	5	10
Part IV:			
1. Basic Tamil/Advanced Tamil/Non–Major (I and II Semester)	2	2	4
2. Skill Based Elective (One Paper/Semester)	4	3	12
3. EVS (IV Semester)	1	2	2
4.Value Education (VI Semester) Sarvodaya Prayer	1	2	2
Part V: (Extension Activities VI Semester)			
1. Sports	—	—	1–5
2. N.C.C.	—	—	1–3
3. N.S.S.	—	—	1–3
4. Rotaract	—	—	1–3
5. E.D.P.	—	—	1–2
6. Extra–Curricular (max: 4 credit; min: 1 credit) (Speech/Music/Dance etc.)	—	—	1–2
Total			139-144

Question Paper Pattern for B.Sc.Physics, Credit cum Semester Pattern
A: Core Papers (Maximum 60 Marks)

PART A (10x 1=10marks)
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
11 & 12	From any unit

PART B (5x4=20marks)
Answer any FIVE Questions.

Question #	Unit
13	From Unit 1
14	From Unit 2
15	From Unit 3
16	From Unit 4
17	From Unit 5
18	From ANY Unit
19	Problem from any Unit(s)

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

Question #	Unit
20	From Unit 1
21	From Unit 2
22	From Unit 3
23	From Unit 4
24	From Unit 5

S.D.N.B. VAISHNAV COLLEGE FOR WOMEN

CHENNAI – 44

DEPARTMENT OF PHYSICS

SYLLABUS

I YEAR – MAJOR

I&II SEMESTER

S. D.N.B VAISHNAV COLLEGE FOR WOMEN, CHROMEPET, CHENNAI-44 (AUTONOMOUS)

SYLLABUS

B.Sc. PHYSICS

CORE PAPER I-SEMESTER-I

P1-PROPERTIES OF MATTER

UNIT I: GRAVITATION

Kepler's law of motion-Newton's law of gravitation-Determination of G-Boy's method-Variation of g with altitude, latitude and depth-Gravitational field and gravitational potential.-Gravitational field due to solid sphere.

UNIT II: ELASTICITY

Hooke's law—Elastic moduli – Relation between elastic constants – Poisson's Ratio – Expression for Poisson's Ratio in terms of elastic constants- Cantilever – Expression for bending moment – Expression for depression- Experiment to determine Young's modulus by Koenig's method.

UNIT III: TORSION

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 IV: SURFACE TENSION

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.

UNIT V: 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.

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.

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. **Mechanics and General properties of matter** by P.K. Chakrabarthy – Books and Allied (P) Ltd., 2001.
4. **Fundamentals of physics**, 6^{th} Edition, by D. Halliday, R.Resnick and J. Walker, Wiley, NY, 2001.
5. **Physics**, 4^{th} Edition, Vols.1, 2&2 Extended by D. Halliday , R.Resnick and K.S.Krane, Wiley,NY,1994.
6. **CRC Handbook of Physics and Chemistry**, 80^{th} Edition.,CRS press, NY, 1999.
7. **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-I

P2 – THERMAL PHYSICS

UNIT 1: THERMOMETRY

Types of thermometers-Platinum resistance thermometer – Callender and Griffith's bridge-Thermistor – Constructions and applications.

UNIT I1: CALORIMETRY

Specific heat capacity – Specific heat capacity of solids – Dulong and Petits law – Specific heat capacity of liquid – Method of mixtures –Half time correction– Specific heat capacity of gases – C_p by Regnault's and Callender and Barne's methods – C_v by Joly's method–Mayer's relation between C_p & C_v.

UNIT III: LOW TEMPERATURE PHYSICS

Joule Thomson Effect – Porous plug experiment – Liquefaction of air-Linde's method – Principles of Adiabatic demagnetization – practical applications of low temperatures – Refrigeration – carnot's cycle as refrigerator – electrolux refrigerator- Frigidaire – air conditioning machines – effects of CF_2Cl_2 on ozone layer.

UNIT IV: CONDUCTION

Definition of thermal conductivity –thermal diffusivity – Rectilinear flow of heat along a bar-thermal conductivity of bad conductor – Lee's Disc method.

UNIT V: RADIATION

Radiation – black body radiation – Energy distribution in blackbody radiation –Kirchoff's law – Wein's law, Rayleigh – Jean's law –Derivation of Planck's law – Stefan's law and its verification.

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BOOKS FOR STUDY

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

BOOKS FOR REFERENCE

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

S.D.N.B. VAISHNAV COLLEGE FOR WOMEN

CHENNAI – 44

DEPARTMENT OF PHYSICS

SYLLABUS

I YEAR – ALLIED

I/III& II/IV SEMESTER

SEMESTER I/III

ALLIED PHYSICS PAPER – I

UNIT I : SIMPLE HARMONIC MOTION AND CIRCULAR MOTION

Composition of two Simple harmonic motions along a line and at right angles – Lissajous figures. – Centripetal and Centrifugal forces – Banking on curved tracks.

UNIT II: ELASTICITY

Elastic constants –Relation between Elastic constants–Experiment to determine young's modulus by non-uniform bending — Torsion of a wire – Experiment to determine rigidity modulus by torsional pendulum & static torsion.

UNIT III: VISCOSITY&SURFACE TENSION

Coefficient of viscosity – Derivation of Poissuelle's formula – Comparison of viscosities of two liquids .Surface tension-Method of drops-Determination of surface tension and interfacial surface tension-Drop weight method.

UNIT IV: Heat and sound

Postulates of Kinetic theory of gases – Vanderwaal's equation of state – Derivation of critical constants .Ultrasonic -Production of ultrasonic waves by piezoelectric method-uses of ultrasonic's.

UNIT V: Electricity and magnetism

Principle of potentiometer- Calibration of low range voltmeter using potentiometer. Magnetic field due to a current carrying conductor-Biot-Savart's law-Field along the axis of a coil.

BOOKS FOR STUDY AND REFERENCE

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

SEMESTER I/III

ALLIED PHYSICS – PAPER II

UNIT I: OPTICS

Combination of two prisms - Combination of two prisms to produce dispersion without deviation and deviation without dispersion. – Interference in wedge shaped films-Determination of Diameter of a wire.

UNIT II: ATOMIC PHYSICS

Atom model – vector atom model –Quantum numbers associated with vector atom model-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.

UNIT IV: LOW TEMPERATURE PHYSICS

Joule Thomson effect-Porous plug experiment-Theory and applications-Liquefaction of air-Linde's method-Practical applications of low temperature.

UNIT V: ELCTRONICS

AND, OR, NOT gates – NAND and NOR gates – Universal building Blocks. Boolean algebra – DeMorgan's theorem – verification of Demorgan'sthorem.

BOOKS FOR A STUDY AND REFERENCE:

1. **Allied physics by** Dr.K.Thankaraj and Dr.D.Jayaraman
2. **Allied physics I& II by** R.Murugeshan.
3. **Text book of Optics by** Brijlal and Subramanian.
4. **Modern Physics by** R.Murugeshan S. Chand & Co.
5. **Physics, 4th Edition, Vols 1, 2 &2 Extended by** D.Halliday,R.Resnick and K.S.Krane, Wiley,NY,1994.
6. **Digital Principles and Application –** Malvino & Leach.

CORE PAPER III- SEMESTER-II

P3-Acoustics and Thermodynamics

UNIT I: WAVES AND OSCILLATIONS

Simple Harmonic Motion – Free, Damped, Forced vibrations (qualitative treatment only) – Fourier's Theorem.

UNIT II: ULTRASONICS

Production of ultrasonic waves – Piezo electric crystal method – Magnetostriction method – Properties – Application to science, industry and medicine

UNIT III: THERMODYNAMICS

Thermodynamic system-Thermodynamic equilibrium-Laws of thermodynamics (Statement only)-Zeroth law of thermodynamic-Application of first law to isothermal and adiabatic process-work done in isothermal and adiabatic process.

UNIT IV:HEAT ENGINES

Carnot engine-efficiency-Practical heat engine-Otto and diesel engine and petrol engine (no derivation for η).

UNIT V: ENTROPY

Entropy-change in Entropy-Reversible and irreversible process. Maxwell's thermodynamic relation.

BOOKS FOR STUDY

1. **Thermal Physics** – D.Jayaraman, K.Ilangovan.
2. **Thermal Physics-**R.Murugesan
3. **Heat and Thermodynamics** – D.S. Mathur.
4. **Heat and Thermodynamics** – Brij Lal and Subramaniam, S.Chand & Co. 16th Edition.
5. **Text book of Sound by** Brijlal and Subramaniam.N, Vikas Publishing House, New Delhi, 1982.
6. **Text book of Sound by** M.N. Srinivasan-Himalaya Publications.

BOOKS FOR REFERENCE

1. **Heat and Thermodynamics** – J.B.Rajam and C.L. Arora.
2. **Thermodynamics and Statistical Physics** – Sharma and Sarkar.
3. **Fundamentals of Physics**,6th Edition, by D.Halliday,R.Resnick and J.Walker, Wiley, NY,2001.
4. **Thermal Physics**, A.B.Gupta and H.Roy, Books and Allied(P) Ltd., (2002)
5. **Physics**, 4th Edition, Vols.1,2&2 extended by D.Halliday,R.Resnick and K.S. Krane, Wiley, NY, 1994.
6. **CRC hand book of physics and Chemistry**, 80th Ed.,CRS press,NY,1999.
7. **The Feynman Lectures on Physics**,Vols.1,2&3 by R.P.Feynman, R.B.Leighton and M Sands, Narosa, New Delhi.
8. **A Text book of sound** by Khanna.D.R & Bedi.R.S., Atma Ram & Sons, New Delhi. (1985)

CORE PAPER IV -SEMESTER-II

P4- MECHANICS

UNIT I: RIGIDBODY DYNAMICS:

Compound pendulum theory-condition for minimum period-interchangeability of centre of suspension and centre of oscillation-g using compound pendulum-Bifilar pendulum-parallel and non parallel threads.

UNIT II: CENTRE OF GRAVITY:

Definition of centre of gravity and centre of mass -Distinction between C.G and C.M-centre of gravity of a right solid cone- centre of gravity of ahollow right circular cone- centre of gravity of a solid hemisphere- centre of gravity of a ollow hemisphere.

UNIT III: CENTRE OF PRESSURE:

Definition-centre of pressure of a rectangular lamina- centre of pressure of a triangular lamina-Floating bodies-Laws of floatation-Stability of floating bodies.

UNIT IV: CLASSICAL MECHANICS I:

Basic concepts-Degrees of freedom-Constraints-Holonomic and non Holonomic constraints-Scleronomics and Rheonomic constraints-Generalised coordinates-Principle of virtual work-D'Alembert's principle-Derivation of Lagrange's equation of motion.

UNIT V: CLASSICAL MECHANICS II:

Phase space-Hamiltonian function H-Hamiltonian equation-Physical significance of H-Application to Harmonic oscillator.

BOOKS FOR STUDY

1. **Mechanics** – Part I & II by Narayanamoorthy National Publishing Company.
2. **Classical Mechanics** – H. Goldstein, Addison Wesley Publications.

BOOKS FOR REFERENCE

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

S.D.N.B. VAISHNAV COLLEGE FOR WOMEN

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DEPARTMENT OF PHYSICS

SYLLABUS

II YEAR – MAJOR

III & IV SEMESTER

CORE PAPER V- SEMESTER-III

P5 MATHEMATICAL PHYSICS AND STATISTICAL MECHANICS

UNIT I: MATRICES

Eigen Values and Eigen vectors-Characteristic equation of a matrix-Cayley –Hamilton Theorem-Diagonalisation of 3x3 real symmetric matrices.

UNIT II BETA AND GAMMA FUNCTION

Definition of Beta and Gamma function-Evaluation of Beta and Gamma function Relation between Beta and Gamma function Simple problems.

UNIT III SPECIAL FUNCTIONS

Series solution for Hermite Differential equation-Series solution for Bessel's Differential equation-Legendre's, Laguerre's Differential equations solutions only.

UNIT IV CLASSICAL STATISTICS

Phase Space-Micro and Macro states-Ensembles-and its types-Postulates of statistical mechanics-Maxwell-Boltzmann distribution law-Application of Maxwell-Boltzmann distribution to an Ideal gas.

UNIT V QUANTUM STATISTICS

Postulates of Quantum statistics-Bosons and Fermions-Derivation of Bose-Einstein distribution law-Derivation of Fermi-Dirac distribution law.

BOOKS FOR STUDY AND REFERENCE

1. **Mathematical Physics** – B.D. Gupta.
2. **Statistical Mechanics** – Sathya prakash & C. Agarwal Kedarnath & Ramnath & Co., VII edition.
3. **Mathematical Physics** - Sathya Prakash.
4. **Statistical Mechanics –** Sathya prakash & C. Agarwal Kedarnath & Ramnath & Co., VII edition.
5. **Thermal Physics –**Dr.D.Jayaraman and Dr.K.Ilangivan
6. **Advanced Engineering Mathematics –** VIII edition by Kreyszig.E, Wiley Publ. NY 1989.
7. **Mathematical Physics by** Ghatak A.K, Gayal I.C., Chaira S.G., Macmillan, New Delhi, 1995.

CORE PAPER VI -SEMESTER-III

P6 -OPTICS

UNIT I: INTERFERENCE

Coherent sources-Coherent waves-Principle of superposition-Types of interference-Constructive and destructive interference-(statement only)-Wedge shaped film-Determination of thickness of the thin wire –Testing of optical flatness-Colours of thin films-Micelson's interferometer-theory-Application to determine the wavelength of monochromatic source.

UNIT II:DIFFRACTION

Zone plate-Distinction between interference and diffraction-Plane diffraction grating- Normal incidence-theory -Oblique incidence- and experiment to determine wavelength. Missing order-and overlapping-Rayleigh criterian for resolution-Limit of resolution- Limit of resolution of eye.

UNIT III : POLARISATION OF LIGHT

Polarisation by reflection-Brewster's law-Double refraction-Uniaxial crystal-Huygen's theory of double refraction in uniaxial crystal-Nicol prism-principle construction and uses.Optical activity-Laurent's half shade polarimeter.

UNIT IV OPTICAL INSTRUMENT

Camera-camera lenses-Ramsden eye piece-merits and demerits-Refracting astronomical telescope-Prism-Binocular

UNIT V FIBER OPTICS

Optical fiber-Definition-Principle and structure-optical fiber cable –critical angle of probagation-Acceptance angle.

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**, 6^{th} edition , by D.Halliday, R.Resnick and J.Walker, Wiley, NY, 2001.
7. **Physics, 4^{th} 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**, 80^{th} 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 VII- SEMESTER IV

P7-ATOMIC PHYSICS

UNITI: ELECTRON

Determination of the electronic charge-Millikan's oil drop method-The free electron theory of metals-Expression for electrical conductivity- Expression for thermal conductivity-Electron microscope.

UNITII: POSITIVE RAYS

Property of X-rays-positive ray analysis-Thomson parabola method-Bain bridge 's mass spectrograph.

UNIT III: FINE STRUCTURE OF SPECTRAL LINES

Optical spectra-Spectral terms- Spectral notations-selection rules-intensity rules- interval rule-fine structure of sodium D lines-Zeeman effect-Experimental arrangement for normal Zeeman Effect.

UNIT IV: PHOTO ELECTRIC EFFECT

Experimental investigation on Photoelectric effect-laws of photoelectric emission-Einstein's photoelectric equation-experimental verification of Einstein's photoelectric equation by Millikan's experiment-Photoelectric cells- Photoemmissive cell- Photovoltaic cell-Photoconductive cell-Application of Photoelectric cells.

UNIT V: X-RAYS

Production of X-Rays-Coolidge tube- Absorption of X-Rays-Bragg's law- Bragg's X-Ray photometer-The Powder crystal method-Laue method-Rotating crystal method.

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, 5th Edition, 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. **Perspectives of Modern Physics** by Beiser, McGraw Hill.
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, Wilsey , NY, 1994.
8. **CRC Handbook of Physics and Chemistry**, 80th edition, CRS Press, NY, 1999.
9. **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 IV

P8- ELECTRICITY AND MAGNETISM

UNIT I: GAUSS'S LAW

Gauss law –statement and proof of Gauss law-Applications of Gauss law to an insulated conductor- electrifield due to a uniformly a charged sphere.

UNIT II: ELECTRICAL MEASUREMENTS

Potentiometer-Principle of Potentiometer-Calibration of ammeter-Calibration of High and low range voltmeter- Resistance-comparison of emf-Internal resistance.

UNIT III: 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-Measurement of high resistance by leakage.

UNIT IV: THERMOELECTRICITY

Seebeck effect-Peltier effect-Statements only-laws of thermo emf- Total emf in a thermocouple-Pyrroelectricity-Thermoelectric refrigerator-Thermoelectric effects in PN junction-Determination of the Peltier coefficient at a junction.

UNIT V: Magnetic properties of materials

Magnetic induction (B)- Magnetisation (M)- Relation between three magnetic vectors B,H and M-Magnetic susceptibility- Properties of Diamagnetic materials- Properties of Paramagnetic materials- Properties of ferromagnetic materials-Antiferromagnetism and ferrimagnetism- the elec tron theory of magnetism.

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., 3rd Edition, 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**, 80th ED., 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.

ALLIED PHYSICS – PRACTICALS

(At the end of Second/Fourth Semester)

Time: 3 Hrs **Marks: 75**

Internal: 15

External: 60

ANY FIFTEEN EXPERIMENTS

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 - Drop Weight method
6. Iinterfacial torsion between two liquids by Drop Weight method.
7. Comparison of viscosities two liquids – Burette method.
8. Specific heat Capacity of a Liquid – Half – Time correction.
9. Sonometer – A.C. Frequency.
10. Newton's rings Radius of curvature.
11. Air wedge – thickness of a wire.
12. Spectrometer – grating – wavelength of Hg lines.
13. Potentiometer – voltmeter calibration.
14. P.O.Box – Specific resistance.
15. B.G.- Figure of merit.
16. Study of AND,OR,NOT gates – using IC
17. Zener Diode – Characteristics.
18. NAND gate as a universal gate.

Note: Use of Digital balance and digital thermometer is permitted.

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.

S.D.N.B. VAISHNAV COLLEGE FOR WOMEN

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DEPARTMENT OF PHYSICS

SYLLABUS

III YEAR

V&VI Semester

CORE PAPER- IX –SEMESTER V

P9- ELECTRO MAGNETISM

UNIT I: ALTERNATING CURRENT

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.

UNIT II:ELECTROMAGNETIC INDUCTION I

Faraday's laws of electromagnetic induction-self induction-determination of self inductance by Raleigh's method-mutual inductance-Experimental determination of mutual inductance-coeffiecnt of coupling-Eddy currents- Uses of Eddy currents.

UNIT III:ELECTROMAGNETIC INDUCTION II

A Conducting rod moving through a uniform magnetic field-Inductances in series - Inductances in parallel –Self inductance of coaxial cylinders-rotating magnetic field (Principle of an Ac Induction motor- Working of single phase induction motor.

UNIT IV: Generators and motors

Three phase Ac generator-DC dynamo-series wound dynamo-shunt wound dynamo-compound wound dynamo-DC motor.

UNIT V: MAXEWELLS EQUATIONS AND ELECTROMAGNETIC WAVES

Introduction-displacement current-Maxewells equations in material media-Plane electromagnetic waves in freespace-velocity of light-Poynting vector-Hertz experiment for production and determination of electromagnetic waves.

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., 3rd Edition, 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 PAPER- X- SEMESTER V

P10-BASICS OF NANOSCINCE

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- 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- XI – SEMESTER V

P11-NUCLEAR PHYSICS

UNIT 1 NUCLEAR STRUCTURE

Measurement of Nuclear radius-parity-Nuclear models- The Shell model-Fermi gas model of the Nucleus.

UNIT II:RADIOACTIVITY

Radioativity-α β and γ rays –properties-Laws of radioactive disintegration-Half life and mean life-Measurement of decay constant-units of radioactivity-Laws of successive disintegration.

UNIT III:PARTICLE ACCELARATOR

The linear accelerator –The cyclotron-The synchrocyclotron-The proton synchrotron.

UNIT IV DETECTORS

Ionization chamber-Geiger –Muller counter-The Wilson cloud chamber-Bubble Chamber-The scintillation counters.

UNIT V ELEMENTARY PARTICLES

Discovery of cosmic rays-Latitude effect-Azimuth effect-Altitude effect-primary and secondary cosmic rays-Cosmic ray showers-origin of cosmic rays-Elementary particles-Introduction-particles and antiparticle-Antimatter-The fundamental interaction-Elementary particle quantum numbers.

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 and Nuclear Physics by** N. Subramaniam and Brij Lal, S. Chand & co, 5th Edition, 2000.
2.**Concepts of Modern Physics by** A. Beiser, Tata McGraw-Hill, New Delhi, 1997.
3.**Perspectives of Modern Physics by** Beiser, McGraw Hill.
4. **Nuclear Physics by** V.DevanathanNarosa publishing house New Delhi
5. **1.Atomic and Nuclear Physics** Vol I & II by S.N Ghoshal S. Chand&co

CORE PAPER- XII –SEMESTER V

P12-MICROPROCESSOR ARCHITECTURE AND PROGRAMMING

UNIT 1:DIGITAL FUNDAMENTAL AND MICROCOMPUTER ORGANISATION

Binary number system-Hexadecimal number system-Decimal to hex conversion-Hex to decimal conversion-Binary coded decimal.ROM & RAM-Static and dynamic RAM-Microprocessor as CPU-Input and output unit-system bus and bus structureExecution of an instruction.

UNIT II: ARCHITECTURE

Pin functions of 8085-Pin-out signal function diagram-.Architecture of 8085 – registers arry-ALU and its associated circuitary- flags, Instruction register and decoder-Demultiplexing address/data bus-control and status signals-Control bus-Programmer's model of 8085.

UNIT III: INSTRUCTION SET I

Instruction set of 8085-data transferinstruction I- arithmetic, logic instruction-compare and special instruction.Rotate instruction-Assembly language to hex code.

UNIT IV: INSTRUCTION SET II

Transfer instruction -II branching and stack instruction- machine control group of instructions-Addressing modes-register, register indirect, direct, and immediate and implied addressing modes.

UNIT V:PROGRAMMING EXERCISE

Assembly language and machine language-Programming exercises-addition, subtraction, Multiplication and division (all 8-bit binary), ascending order/descending order.

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.

ELECTIVE PAPER- I –SEMESTER V

E1-NUMERICAL METHODS

UNIT 1 : SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS

Method of triangularisation - Gauss elimination method of solving simultaneous linear equations - Inverse of a matrix - Gauss elimination 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- XIII –SEMESTER VI

P13 -SPECTROSCOPY AND LASER PHYSICS

UNIT I: **Introduction to Spectroscopy UV 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 of UV Spectro photometer (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 –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- Applications of Lasers in communication and medicine

UNIT V: Applications of Holography

Holography: Recording –Theory Of reconstruction of images – Characteristics of a hologram -Classification of hologram--Practical application of hologram.

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- XIV –SEMESTER V

P14- 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- 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,
6. Wiley,NY, 2001.
7. **Physics,4th edition, Vols1,2,&2 extended** by D. Halliday, R.Resnick and K.S.
8. Krane,Wiley,NY, 1994.
9. **CRC Handbook of Physics &Chemistry,80th edition**,CRS Press,NY,1999.
10. **The Feynman Lectures on Physics, Vols 1,2 and3**, by R.P. Feynman, R.B. Leighton
11. and M Sands, Narosa, New Delhi, 1998.
12. **Concepts of Modern Physics ,5th edition** by A.Beiser, Tata McGraw Hill,1997.
13. **Seven wonders of Cosmos by J.Narlikar**, Cambridge University Press.
14. **After the First 3 Minutes** by T.Padmanabhan,Cambridge University Press.

CORE PAPER- XV–SEMESTER

P15 –SOLID STATE PHYSICS AND SEMICONDUCTOR DEVICES

UNIT I: CRYSTAL STRUCTURE

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

UNIT III: MAGNETIC PROPERTIES

Different type of Magnetic materials- -Para, dia, and ferromagnetic materials-Classical theory of Diamagnetism (Langevin's theory)--Weiss Theory of Para magnetism- Curie weiss Law-Hysteresis.

UNIT IV: DIELECTRIC PROPERTIES

Fundamental Definitions in Dielectrics-Different types electric polarization-Frequency and temperature effects on polarization-Dielectric loss- 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- UJT relaxation oscillator-SCR as a Switch .

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:

1. **Material Science and Engineering** by V. Raghavan, PHI.
2. **Introduction to Solids** by Azaroff, TMH.
3. **Concepts of Modern Physics** by Beiser, Tata Mc. Graw Hill, 5th Edition, 1997.
4. **Solid State Physics** by J. Dekker, Macmillan India Ltd.
5. **Fundamentals of Physics,6th 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. **CRC Handbook of Physics and 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. **Introductory Solid State Physics** by H.P. Mytrs, Viva Books, New Delhi, 1998.
10. **Elementary Solid State Physics** by M.A. Omar, Pearson Education, 2002.
11. **Introduction to Solid State Physics** by Kittel, Wiley and Sons,7th Edition.
12. **Solid state physics by** S.O.Pillai.
13. **Elements of Crystallography by** prof.D.Velmurugan.
14. **Integrated Electronics by** Millman and Halkias.
15. **Integrated Electronics by** Malvino and Leach.

CORE PAPER- XVI–SEMESTER VI

P-16 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.

ELECTIVE PAPER- II–SEMESTER VI

E2- MICROPROCESSOR INTERFACING AND APPLICATIONS

UNIT I: 8085 INSTRUCTION TIMINGS

Introduction-Memory read cycle-Memory write cycle-Timing diagram for MOV B,A instruction and MVI A 25 instruction.

UNIT II: MEMORY INTERFACE

Memory interface Basics-generating control signals-Interfacing 2Kx8 ROM and 2kx8 RAM interface.

UNIT III: INTERFACING I/O PORTS

Interfacing input port and output port to 8085-IN instruction and its timing diagram-OUT instruction and its timing diagram –Design of an input port and output port.

UNIT IV: INTERRUPTS

Interrupts in 8085-hardware and software interrupts-RIM, SIM instructions-priorities.

Simple-polled and interrupt controlled data transfer.

UNIT V PERIPHERAL DEVICES AND APPLICATIONS

Programmable peripheral interface 8255-LED interface Flashing LEDs-Seven segment display interface.

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.

NON MAJOR ELECTIVE- SEMESTER I

ROBOTICS I

Unit I

Introduction – Components - Power source- Actuators-Electric motors-Sensors –Manipulators.

Unit II

Robotic Movements – Walking, Hopping Flying, Swimming - Inverse Dynamics.

Unit III

Human robot interaction-Artificial intelligence- Speech recognition-Robotic voice Gestures - Facial expression- Artificial emotions -Personality – Controls.

BOOKS FOR STUDY

1**. Robotics by k.**k.Appuu Kuttan.IK international publishing house pvt.limited, New Delhi**.**
2. **Robotics –Control and Programming by** J.Srinivas,R V Dukkipati &K.Ramji Narosa publishing house.
3. **Robotics & Industrial Automation by** R K Rajput, S.Chand&company ltd.
4. **Industrial Robotics-Technology, programming &Application b**y MikealP.Groover&others Tata McGraw-Hill edition.

NON MAJOR ELECTIVE- SEMESTER II

ROBOTICS II

Unit I

Modern Robots and their applications.

Unit II

Practical - Building Robots - component parts.

Unit III

Practical - Demonstration of Robotic movement.

BOOK FOR STUDY

1. **Robotics by** k.k.Appuu Kuttan.IK international publishing house pvt.limited, New Delhi.
2. **Robotics –Control and Programming** by J.Srinivas,R V Dukkipati &K.Ramji Narosa publishing house.
3. **Robotics & Industrial Automation by** R K Rajput, S.Chand&company ltd.
4. **Industrial Robotics-Technology, programming &Application b**y MikealP.Groover&others Tata McGraw-Hill edition.

CORE PRACTICAL-I

(At the end of Second Semester)

Time: 3 Hrs **Marks: 50**

Internal: 20

External: 30

ANY FIFTEEN EXPERIMENTS

1. Use of software for drawing graph.
2. Young's modulus – Non-uniform bending - Pin & Microscope
3. Young's modulus – Uniform bending – Optic lever
4. Rigidity modulus – Torsional pendulum (without identical masses)
5. Rigidity modulus - Torsional pendulum (with masses)
6. Surface tension of a given liquid by drop weight method
7. Interfacial surface tension between two liquids by drop weight method.
8. Coefficient of viscosity of liquid – Graduated burette (radius of capillary tube given)
9. Sonometer – Frequency of tuning fork and mass of the solid.
10. Sonometer –R.D. of a solid and liquid.
11. Specific heat capacity of liquid –Newton's law of cooling
12. Specific heat capacity of liquid – Method of mixtures(Half-time correction)
13. Focal length, power, R and μ of a convex lens.
14. Focal length, Power, R and μ of a concave lens.
15. Spectrometer - μ of a Solid.
16. Spectrometer- μ of a liquid.
17. P.O. Box –Specific resistance. of a coil
18. Potentiometer – Voltmeter Calibration.
19. Demonstrative Experiment-Ultrasonic Interferometer.

Note: Use of Digital balance and digital thermometer is permitted.

CORE PRACTICAL- II

(At the end of fourth semester)

Time: 3 hrs **Marks: 50**

Internal 20

External: 30

ANY 15 EXPERIMENTS ONLY

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

- Note : use of digital balance and digital thermometer is permitted.

CORE PRACTICALS III

(At the end of VI semester)

Time: 3hrs **Marks: 100**

Internal:40

External:60

ANY FIFTEEN EXPERIMENTS ONLY

1.Young's Modulus-Koenig's method- Non-uniform bending..
2.Newton's rings-R_1,R_2 **and μ**
3.Spectrometer- i-i ' curve.
4.Spectrometer-Dispersive power of a prism.
5.Calculation of Cauchy's constant using software.
6.Spectrometer-Narrow angled prism.
7.Field along the axis of a circular coil-Deflection magnetometer-B_H and M.
8.Field along the axis of a circular coil-Vibration Magnetic needle-$B_{H.}$
9.EMF of a thermocouple-Mirror galvanometer(or table galvanometer)
10. Potentiometer-EMF of a thermocouple
11. Potentiometer-Caliberation of high range voltmeter.
12. Potentiometer- Comparisons of EMFs.
13. Potentiometer-Internal resistance of a cell.
14. Conversion of a milli ammeter into a voltmeter & ammeter of various ranges and ohmmeter.
15. B.G.-Figure of merit(for charge)
16. B.G.-Comparison of capacitances.
17. B.G.-Absolute capacitance of a capacitor.
18. B.G.-Comparison of mutual inductances.
19. B.G.-Absolute mutual inductance.
20. B.G.-Comparisons of EMFs.
21. B.G.-Internal resistance of a cell.
22. Bridge rectifier-Zener regulator power supply-9V-Regulating characteristics.
23. Demonstrative Experiment-Crystal growth.
24. Demonstrative Experiment-GM Counter.

- Note: Use of Digital balance and digital thermometer is 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: 100**

Internal:40

External:60

ANY FIFTEEN EXPERIMENTS

1. Bridge rectifier-Zener regulator power supply-9V-Regulating characteristics.
2. Harley Oscillator
3. Colpitt's Oscillator
4. Phase shift Oscillator
5. Clipping and Clamping circuits.
6. Differentiating and Integrating circuits.
7. Transistor-astable multivibrator.
8. OpAmp-inverting amplifier,Non-inverting amplifier and unity follower.
9. NAND/NOR as universal gates.
10. Half adder and Full adder.
11. Half subtractor and Full subtractor.
12. Study of Multiplexers and Demultiplexers.
13. 4-bit ripple counter using 7473/7476
14. 4-bit shift register using 7473/7476
15. Decade counter 7490.
16. Study of J K flip flop&D flip flop
17. Study of R S flip flop
18. Schmitt trigger-555 timer/op amp
19. Verification of Demorgan's theorem using IC.

CORE PRACTICAL V

(At The End of VI Semester)

Time: 3hrs **Marks: 100**

Internal: 25

External: 75

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
20. Op-Amp-741 Astable multiviberator
21. Demonstrative Experiment-Microcontroller-8051-8 bit Addition and Subtraction.

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).