APPENDIX - D

MADURAI KAMARAJ UNIVERSITY
(University with Potential for Excellence)

(MODIFIED) REVISED SYLLABUS FOR B.Sc., (Physics) under CBCS
(With effect from the academic year 2009-2010)

1. **Objectives :**

   The Syllabus for B.Sc., Physics degree under semester system has been designed on the basis of Choice Based Credit System,(CBCS) which would focus on job oriented programmes and values added education. It will effect from June 2009 onwards.

2. **Eligibility :**

   A pass in +2 examination conducted by the Board of Higher Secondary Education, Govt of Tamil Nadu with Physics & Mathematics OR any other examination accepted by the syndicate, as equivalents thereto are eligible to join this course.

3. **Duration of the course :**

   The students who are joining the B.Sc., (Physics) degree shall undergo a study period of three academic years –Six Semesters.

4. **Subjects of study and scheme of examination :**

   The subjects offered in major physics for six semesters and the scheme of examination are given.

5. **Question Paper Pattern :**

   The Internal and External marks is 25:75

External

The pattern of Question Paper will be as follows :

Time : 3Hours   Max.Marks :7

Section A: (10X1=10marks)

Question No. 1 to 10 (Multiple choice)

1.   Two questions from each unit

2.   Four choices in each question

3.   No 'none of these' choice

~~Section of~~

Secon of): (5X7=35 marks)

Answer all questions choosing either (a) or (b)

Answers not exceeding two pages.

(One question from each unit)

Question No: 11-15

11	(a)	or	11	(b)
12	(a)	or	12	(b)
13	(a)	or	13	(b)
14	(a)	or	14	(b)
15	(a)	or	15	(b)

Section C: (3X10=30 marks)

Answers not exceeding four pages.

Answer any three out of five (Question from each unit)

Questions 16-20

There must be **atleast one problem in section B and section C**

Internal

1. The Pattern for internal valuation may be: two tests – **15marks** each : **average 15marks**

2. Group Discussion / Seminar / Quiz – **5 marks**

3. 2 Assignments : 5 mark each; average **5 marks**

4. 3rd test may be allowed for absentees of any one of the two tests.

5. For Quiz, 2 Quiz should be conducted.

Blue Print of the Question Paper ()external – Core Subjects

Maximum Marks : 75

Section	Types of questions	No. of Questions	No. of Questions to be answered	Marks for each question	Total Marks
A	Multiple Choice Two questions from each unit	10	10	1	10
B	Not exceeding 2 pages (either or type) – One from each unit*	5	5	7	35
C	Not exceeding 4 pages (any three out of five) – One from each unit	5	3	10	30

*.There must be atleast one problem in Section B and Section C.

6. There will be Two Allied subjects to fulfill the course during three years.

Subject	Maximum marks	Year of Study
Mathematics	600	I & II
Chemistry / Applied Electronics	600	II&III

- The syllabus for the ancillary subjects can be gót from the Ancillary Department of Mathematics, Chemistry / Applied electronics.

- Practicals : Record Note Book / Internal   10 + 30   =   40
  Examination external   =   60

                                          Total   100
                                                          ----

7. Eligibility fo the degree:

i. A candidate will be eligible for the B.Sc., degree by completing three years (six semesters) and passing all the prescribed examinations.

ii. A candidate shall be declared as passed the course, if he/she scored a minimum of 35% marks in each paper of all the subjects.

B.Sc., Semester - I

Part	Study Component	No. of Course	Credit	Hours
I	Tamil/Other languages	1	3	6
II	English	1	3	6
III	Core Subject 1	1	4	4+2(P)
	Allied Subject 1-1	2	4	4+2(P)
IV	Skill Based Subjects 1&2	2	2+2	2+2
	Non – Major Elective 1	1	2	2
Total		7	20	30

* Basic Physics - I as NME for those who study other than Physics.

B.Sc., Semester – II

Part	Study Component	No. of Course	Credit	Hours
I	Tamil/Other languages	1	3	6
II	English	1	3	6
III	Core Subject 2	2	4+2*	4+2(P)
	Allied Subject 1-2	2	4+1*	4+2(P)
IV	Skill Based Subjects 3&4	2	2+2	2+2
	Non – Major Elective 2	1	2	2
Total		9	23	30

* Major Practical -I

* Basic Physics - II as NME for those who study other than Physics

B.Sc., Semester – III

Part	Study Component	No. of Course	Credit	Hours
I	Tamil/Other languages	1	3	6
II	English	1	3	6
III	Core Subject 3	1	4	4+2(P)
	Allied Subject 1-3	1	4	4+2(P)
	Allied Subject 2-1	1	4	4+2(P)
Total		5	18	30

B.Sc., Semester – IV

Part	Study Component	No. of Course	Credit	Hours
I	Tamil/Other languages	1	3	6
II	English	1	3	6
III	Core Subject 4	2	4+2*	4+2(P)
	Allied Subject 1-4	2	4+1*	4+2(P)
	Allied Subject 2-2	2	4+1*	4+2(P)
Total		8	22	30

* Major Practical – 2 ;   * Ancillary Practical – 1-2 ;   * Ancillary Practical 2-1

B.Sc., Semester – V

Part	Study Component	No. of Course	Credit	Hours
III	Core Subject 5,6&7	3	12	12+8(P)
	Allied Subject 2-3	1	4	4+2(P)
IV	Environmental Studies	1	2	2
	Skill Based Subject - 5	1	2	2
Total		6	20	30

B.Sc., Semester – VI

Part	Study Component	No. of Course	Credit	Hours
III	Core Subject 8,9&10	3+3*	12+15*	12+8(P)
	Allied Subject 2-4	2	4+1*	4+2(P)
IV	Value Education	1	2	2
	Skill Based Subject – 6	1	2	2
V	Extension Activities	1	1	0
Total		11	37	30

* Major Practicals – 3, 4 & 5;   *Ancillary Practical – 2-2

SEMESTER – 1

S.No.	Part	Subject	Hours	Credit
1.	III	Mechanics and Relativity CS1	4+2*(P)	4
2.	III	Allied Paper Maths – I	4+2*(P)	4
3.	IV	Properties of Matter SB 1	2	2
4.	IV	'C' Programming –I SB 2	2	2
5.	IV	Non – Major Elective NME I Basic Physics – I	2	2 (14)

- **Basic Physics I as NME for those who study other than Physics**

SEMESTER – 2

S.No.	Part	Subject	Hours	Credit
1.	III	Electricity – CS2	4	4
2.	III	Physics Practical – I	2*(P)	2
3.	IV	Allied Paper Maths -2	4+2	4+1*(P)
4.	IV	Thermal Physics SB 3	2	2
5.	IV	'C' Programming – II SB 4	2	2
6.	IV	Non-Major Elective NME 2 Basic Physics - II	2	2 (17)

- **Basic Physics II as NME for those who study other than Physics**

SEMESTER – 3

S.No.	Part	Subject	Hours	Credit
1.	III	Electro Magnetism – CS3.	4+2*(P)	4
2.	III	Allied Paper Maths 3	4+2*(P)	4
3.	III	Allied Paper Chemistry/Applied Electronics	4+2*(P)	4 (12)

SEMESTER – 4

S.No.	Part	Subject	Hours	Credit
1.	III	Optics and Spectroscopy - CS4	4	4
2.	III	Physics Practical – 2	2*	2
3.	III	Allied Paper Maths - 4	4+2*	4+1*(P)
4.	III	Allied Chemistry/Applied Electronics – 2	4+2*	4+1*(P) (16)

SEMESTER – 5

S.No.	Part	Subject	Hours	Credit
1.	III	Atomic Physics and Q.M – CS5	4+2*(P)	4
2.	III	Nuclear Physics – CS6	4+3*(P)	4
3.	III	Analog Electronics – CS7	4+3*(P)	4
4.	III	Allied Chemistry/Applied Electronics – 3	4+2*(P)	4
5.	IV	Bio – Medical Instrumentation SB – 5	2	2
6.	IV	Environmental Studies	2	2 (20)

SEMESTER – 6

S.No.	Part	Subject	Hours	Credit
1.	III	Classical and Statistical Mechanics CS8	4	4
2.	III	Material Science CS9	4	4
3.	III	Digital Electronics CS10	4	4
4.	III	Physics Practical - 3,4&5	2+3+3	5+5+5*
5.	III	Allied Chemistry/Applied Electronics – 4	4+2*(P)	4+1(P)
6.	III	Opto – Electronics SB-6	2	2
7.	IV	Value Education	2	2
8.	V	Extension Activities	0	1 (37)

SEMESTER – 1   **Mechanics and Relativity – Core Subject 1   Credit-4**

Unit – I

Newton's laws of motion, momentum & impulse. Law of conservation of linear momentum-Collision- Elastic and Inelastic Collision – Newton's law of impact Co efficient of restitution- impact of moving sphere on a fixed plane – Direct –Oblique impact of moving two smooth spheres – Calculation of final velocity of the spheres – loss of kinetic energy.

Unit – II

Moment of inertia of circular disc, about an axis passing through its centre and perpendicular to its own axis – Moment of inertia of a solid sphere about all axes – Angular momentum and Torque – Relation between angular momentum and torque – Kinetic energy of rotation – Expression for the acceleration of a body rolling down on an inclined plane.

Unit – III

Satellites – Orbital Velocity – Stationary satellite – Escape velocity – Jet plane, Rocket – Principle – theory of Rocket – Velocity of Rocket at any instant – Rocket propulsion systems – Specific impulse – Multistage Rocket – Shape of the Rocket.

Unit – IV

Frames of reference – Inertial frames of reference – Galilean transformation, Newtonian relativity – Michelson-Morley Experiment – Significance of negative result.

Unit – V

Postulates of Special theory of relativity – Lorentz transformation – Lorentz, Fitzgerald contraction – time dilation – relativistic addition of velocities. Simultaneity – relativistic mass, relativistic momentum – Mass-Energy equivalence – relation between total energy, rest mass energy and momentum.

Books for Study

1. Mechanics – D.S. Mathur, S. Chand & Co, Edition 2002.

Reference Books

1. Mechanics Part I and Part II, Narayanamoorthy National Publishing Company, 2001.
2. Fundamental of Physics, D. Hallidary, Resnick and J. Walker, 6th Edition, Wiley, New York 2001.

SEMESTER – I
PROPERTIES OF MATTER   (2 Hrs)   SKILL BASED-1   CREDIT – 2

Unit – I

Elasticity – Stress, Strain – Poisson's ratios – Hook's law – Youngs modulus – Bending of beam – Bending moment – Uniform and Non-Uniform – Theory.

Unit –II

Kepler's law of Planetory motion – Newton's law of gravitation – Mass of earth. Potential at a point inside and outside a spherical shell.

Unit – III

Variation of 'g' with depth, altitude and latitude – Earth quake – Seismograph – Modern application of Seismology.

Unit – IV

Definition of Surface Tension – Angle of Contact – Excess of Pressure in Synclastic and anticlastic surface – Capillary rise.

Unit – V

Viscosity – Coefficient of Viscosity – Stream lined and Turbulent motion – Critical Velocity – capillary flow – Bernoulli's theorm – Venturimeter – Pilot's tube.

Book for Study

1. Elements of Properties of matter – D.S. Mathur – S.Chand &Co., 2004.

2. Properties of matter – Murugesan – S. Chand & Co., 2004.

Reference Book

1. Properties of matter – Brijlal and Subramanian S.Chand & Co., 2006.

SEMESTER – I

PROGRAMMING in C – I (2Hours/Week)   SKILL BASED-2   CREDIT-2

Unit –I

Introduction to C – Character set, identifiers and keywords – Date Types – Variables and constans – Various types pf Operators – Arithmatic – Expressions – Input and Output operations.

Unit – II

Simple IF statement – simple IF, ELSE statement – Block IF statement – Block IF ELSE statement - The ELSE if ladder statement - looping operation using while statement – for statement – Break statement – Continue statement – Switch statement – Goto statement – exit function.

Unit – III

Simple programs – To find the volume of sphere – To find the factorial of a number – To find the Fibonacci series – To evaluate sin x – To find the roots of a quadratic equation $ax^2+bx-c=0$.

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Unit – IV

Defining a function - Accesing a function - Category of functios – Passing arguments to function – Recursion – Library functions – Storage class modifiers – Auto, Global, Static Register types – Simple programs.

Unit – V

Using function to sort in the ascending and descending order of magnitude of a given set of numbers – Using function to sum integer values between 1-N recursion technique – To find binomial coefficient – to check whether a given number is odd or even – To sort names in a alphabetical.

Book for Study

1. Theory and problems of Programming with C – By Byron Gottfried – Second edition – Tata Mcgraw Hill, 2004

Reference Books

1. Programming in C – By E. Balagurusamy – Third Edition – Tata Mcgraw Hill, 2004.

2. Programming in C by S. Ramasamy and P. Radhaganesan. Scitech Publications (India) Private Limited, Chennai and Hyderabad, 2006.

SEMESTER – I

NON-MAJOR ELECTIVE – 1   (2Hrs)   BASIC PHYSICS-I   CREDIT-2

Unit – I

S.I. Units – measurements of length, mass time and other Physical quantities – Dimensional formula for area, volume, density and force – Uses of dimension.

Unit – IV

Defining a function - Accesing a function - Category of functios – Passing arguments to function – Recursion – Library functions – Storage class modifiers – Auto, Global, Static Register types – Simple programs.

Unit – V

Using function to sort in the ascending and descending order of magnitude of a given set of numbers – Using function to sum integer values between 1-N recursion technique – To find binomial coefficient – to check whether a given number is odd or even – To sort names in a alphabetical.

Book for Study

1.   Theory and problems of Programming with C – By Byron Gottfried – Second edition – Tata Mcgraw Hill, 2004

Reference Books

1.   Programming in C – By E. Balagurusamy – Third Edition – Tata Mcgraw Hill, 2004.

2.   Programming in C by S. Ramasamy and P. Radhaganesan, Scitech Publications (India) Private Limited, Chennai and Hyderabad, 2006.

SEMESTER – I
NON-MAJOR ELECTIVE – 1   (2Hrs)   BASIC PHYSICS-I CREDIT-2

Unit – I

S.I. Units – measurements of length, mass time and other Physical quantities – Dimensional formula for area, volume, density and force – Uses of dimension.

Unit – II

Matter – Solid. Liquid, Gas and Plasma – Application of Plasma – change of state – specific heat capacity - specific latent heat of ice and steam.

Unit – III

Kinds of energy – Mechanical energy , Thermal energy, Optical energy , Sound energy, Electrical energy , Atomic and Nuclear energy. (Examples) – Conservation of energy.

Unit – IV

Renewable and non-renewable energy – Fossil fuel – coal-Oil - Solar – Wind – Biomass – OTEC.

Unit – V

Mirror – Laws of reflection – Image formation (Concave and Convex mirror) Lens- Law's of refraction – Image formation (Concave and Convex lens) – Defects of eye and rectification.

Book for Study

1. First Year B.Sc Physics – B.V. Narayan Rao, New Age International (P) Ltd, 1998.

Reference Books

1. Mechanics – D.S. Mathur – S.Chand & Co.,2002
2. Properties of matter - D.S. Mathur- S.Chand & Co., 2002.
3. Properties of matter – Brijlal Subramanian – S.Chand & Co., 2006.

SEMESTER – II   **Electricity – Core Subject – 2**   **CREDIT-4**

Unit – I

Coulomb's Law – Gauss law – its proof – Applications of Gauss's law – Electric field due to charged sphere (a) at a point outside (b) at a point inside (c) at a point on the surface of the sphere. Electric field due to plane sheet of charged conductor – Coulomb's theorem – Mechanical force on the surface of charged conductor – Electric field – flux of electric field – relation between electricfield and potential – Potential due to charged spherical conductor at a point (a) outside (b) on the surface and (c) inside.

Unit – II

Capacitance – Principle of capacitor – expressions for the capacitance - Spherical capacitor – Cylindrical Capacitor – Parallel Plate Capacitor with and without partly filled dielectric – Energy of capacitor – Loss of energy, when two charged conductors share the charges – Types of capacitors, fixed capacitor, variable capacitor, electric capacitors and sliding capacitor.

Unit – III

Kirchoff's laws – Application of Kirchoff's laws to Wheatstone's network – Sensitiveness of Bridge – Carey Foster's Bridge – Determination of the resistance of the given wire with the necessary theory – Principle of Potentiometer – Determination of internal resistance of the cell using Potentiometer – calibration of ammeter and voltmeter – low & high range.

Unit – IV

Biot – Savart's Law – Its application - long straight wire of infinite length-Ampere's Theorem – magnetic field at the center of a circular coil carrying current – magnetic field along the axis of a coil carrying current – solenoid – Ballistic Galvanometer- theory – Damping correction – Comparison between deadbeat and

aperiodic galvanometer- determination of the absolute capacity of condenser, using B.G. (theory) and experiment -- Comparison of Capacitance using B.G. (theory) and experiment.

Unit – V

Seeback effect – thermo e.m.f. – Neutral temperature – Temperature of inversion – law of intermediate metal – law of intermediate temperature – Measurement of e.m.f. of a thermocouple with a potentiometer Peltier effect – Peltier coefficient – Thomson effect – Thomson coefficient – thermoelectric power.

Book for Study

1. Electricity and Manetism by Sehgal, Chopra & Sehgal Sultan , Chand & Sons .,1998.

Reference Books

1. **Electricity**   -R.Murugesan

   S.Chand & Co.2004

2. Electricity and Magnetism   - Dr. K.K. Tewari

   S. Chand & Co. 2002

3. Electricity and Magnetism with electronics   - D.N. Vasudeva

   S. Chand & Co. 2002

4. Electricity and Magnetism 20th revised edition   -Brijlal&Subramaniyam

   S.Chand & Co.2007.

5. Electricity and Magnetism 2nd recvised edition   - Narayanamoorthy &

   Nagarathinam – National Publishing Co.1997.

SEMESTER – II

THERMAL PHYSICS (2Hrs) **SKILLBASED** **CREDIT-2**

Unit – I

Postulates of Kinetic theory – Mean Free Path - Transport Phenomena – Conduction, Viscosity and Diffusion.

Unit – II

Joule – Thomson effect – Porous Plug experiment – Liquification and Oxygen, Hydrogen and Helium – Properties of Helium 1 and Helium 2.

Unit – III

Black body radiation - Prevost's theory – Emissive and absorptive power – Distribution of energy in black body – Wien's Displacement law.

Unit – IV

Stefan's law of radiation – Derivation Newton's law from Stefan's law – Solar constant – Temperature of Sun – Angstrom's pyrhedio meter – Solar Spectrum.

Unit – V

Thermodynamics – Zeroth law – I, II and III law of Thermodynamics – Entropy – Charge of entropy in reversible and irreversible process – Heat death – charge of entropy in converting ice into steam.

Book for Study

1. Heat, Thermodynamics and Statistical Physics   -Brijlal,Subramaniyan and P.S. Hemne. S. Chand & Co.2004.

2. Heat and Thermodynamics   - R.Murugesan S. Chand &Co.2004

Reference Book

1. Heat and Thermodynamics   -   D.S. Mathur (S. Chand &Co 2002.)

SEMESTER - II
PROGRAMMING IN C II (2hours/week)   SKILLBASED-4   CREDIT-2

Unit – I

Defining an Array – Processing an array – one dimensional arrays, two dimensional arrays – Multidimensional arrays – Passing arrays to functions – programmers using arrays and strings.

Unit – II

To multiply two matrices of order (1xm) and (mxn) – To add and subtract two matrices – To arrange the given set of numbers in ascending order – To arrange given set of numbers in descending order.

Unit – III

To find the arithmetic mean, geometric mean and harmonic mean of a given set of Numbers.

Unit – IV

Defining a structure – Processing a structure – Arrays of Structures – Arrays within structures – Unions – bit fields – programmes using structure – to print currently date and time using functions.

Unit – V

To prepare the salary bill for employees of a company   - POINTERS - fundamentals – Pointer declarations – pointers and simple variables.

Book for Study

1.   Programming in C – E. Balagurusamy – Third Edition – Tata Mcgraw Hill 2004

2.   Programming in C by S. Ramasamy and P. Radhaganesan, Scitech Publications (India) Private Limited, Chennai and Hyderabad 2006.

Reference Books

1.   Theory and problems of Programming with C – By Byron Gottfried – Second edition – Tata Mcgraw Hill 2006.

SEMESTER –II

BASIC PHYSICS-II (2Hrs)   **NON-MAJOR ELECTIVE-2**   **CREDIT-2**

Unit – I

Electric current – Voltage and resistance – Ohm's law and Kirchoff's law – Resistance in series and parallel.

Unit – II

DC source – Primary cells – Leclanche and Daniel cell – Secondary cells – Lead Acid Accumulator – DC generator.

Unit – III

Alternating current generating by hydro, thermal and atomic power stations – RMS value – Peak value – (Quantitative) – AC generator –no derivation.

Unit – IV

Measurement of Electric power by Wattmeter – simple Calculations – Induction coil – Wattless current – Power factor.

Unit – V

Simple electrical circuits – resistor, capacitor and inductor connected to ACsource (independently) – Relationship between emf and current in each case . Diode – Bridge Rectifier.

Reference Books

1. Electricity and Magnetism – R. Murugesan - S.Chand &Co 2004.

IT-2

's law –

s – Lead

ations –

iduction

Csource
Bridge

SEMESTER –III   ELECTROMAGNETISM CORE SUBJECT-3 CREDIT-4

Unit – I

Faraday's laws of Electoromagnetic induction, -Lenz's law – self inductance – energy stored in an inductance – Experiment to determine self inductance by Rayleigh method with theory – Mutual inductance – Determination of Mutual inductance using B.G. (with theory) Coefficient of Coupling – Eddy Currents.

Unit – II

Growth & decay of current in LR circuit – Growth and decay of charges in CR circuit - Growth and decay of charge in a circuit with inductance, capacitance and resistance in series – Determination of high resistance by Leakage (B.G.).

Unit – III

Mean value of alternating e.m.f. – RMS value of the alternating current/voltage – Alternating current applied to LR, Cr and LCR circuits – Series Resonance Circuit – Parallel Resonance Circuit - Power in an A.C. Circuit – Wattless Current – Power factor – Q factor – choke – skin effect – A.C. bridges – Maxwell's bridge – Anderson's bridge and Owen.s bridge.

Unit – IV

Definition of B, H, M and magnetic succebitlity - magnetic materials & magnetization – Hysterics – workdone in taking unit volume of magnetic materials through complete cysle of magnetization – Area of Hysterisis loop – Ballistic method. Ferro magnets, ferri magnets and determination of Susceptibility – Guoy's method.

Unit – V

Derivations of Maxwell's equations – types of currents – displacement current – siginificance of displacement current – Maxwell's equation in material media andfree

space – Electromagnetic waves in free space – electromagnetic waves in isotropic non conducting media.

Book for Study

1 Electricity and Manetism by Sehgal, Chopra & Sehgal Sultan, Chand & Sons . 1998.

Reference Books

1. Electricity and Magnetism 20th revised edition   - Brijlal & Subramaniyam, Ravi Offset Printers & Publishers Pvt., Ltd.. 1997.

2. Electricity and Magnetism 2nd recvised edition   - Narayanamoorthy & Nagarathinam, National Publishing & Co.1997.

3. Electricity & magnetism 2nd Edition by Tiwari K.K.S. Chand & Co Edition (2002)

4. Electricity & magnetism – Murugesan R.S.Chand & Coy, New Delhi 2004.

SEMESTER–IV OPTICS AND SPECTROSCOPY-CORE SUBJECT-4 CREDIT-4

Unit – 1

Coherent sources – Interference in thin films – Michelson's interferometer – Applications – Determination of wave length – Resolution of spectral line – Refractive index of a gas – Fabrey – Perot interferometer – Sharpness of fringes – Resolution – Types of interference fringes – Reflection only – Holography.

Unit - II

Zone plate – Theory – Comparison with convex lens fresnel and – Fraunhofer diffraction in straight edge – Rectangular aperture – Circular aperture – Cornus spiral – Concave grating – Mountings – Resolving power of optical instruments- Telescope grating and prism.

Unit – III

Polarization – Polarizer – Analyzer – Polaroids and its applications – Double refraction – Nicol prism – Huygen's explanation of double refraction – QWP – HWP – production and analysis of plane, circularly and elliptically polarized light – Optimal activity – Fresnell's explanation – Specific rotation – Lorentz half shade poiarimeter.

Unit – IV

UV Spectroscopy – sources – detectors & its applications – Infra Red spectroscopy - sources – detectors and its applications – Raman effect – theory, experiment , characteristics of Raman lines and its applications – Doppler effect in optics and applications.

Unit – V

Type of molecular spectra (Basic ideas) – Molecular spectra of diatomic molecules – pure rotational spectra – vibration – rotation spectra – selection rules.

Book for Study

1.   Optics & Spectroscopy   -   Kakani & Bhandari – Sultanchand & Sons, New Delhi – 2002.

Reference Books

1.   A text book of optics   -   Subramanyam & Brijala, S.Chand&Co.2002
2.   M. Nagarathinam   -   V.Gosakan-National publishing Company 1999.
3.   Optics & Spectroscopty   -   S.L.Kakani&Bhandari – Sultanchand&Sons New Delhi 2005.
4.   Spectroscopy   -   B.K.Sharma,GOEL Publishing Hous,Meerut 2006.

SEMESTER – V   ATOMICPHYSICS AND QUANTUM MECHANICS
CORE SUBJECT-5   CREDIT-4

Unit – I

Introduction – Bhor atom model (No derivation) – Applications of Bohr's Theory – Excitation and ionization of atoms. Sommerfield relativistic atom model – Elliptical orbits – Relativistic variation of aromicamass – application to the fine structure of spectral lines, vector atom model – spatial quantization and spinning electron hypothesis – Stern and Gerlach experiment – Quantum numbers – coupling schemes – Pauli's exclusion principle – electronic structure of atoms.

Unit - II

X rays – characteristics and continuous X ray – its properties – application – Duane and Hunt law – Mosley's law and its importance. Compton effect – Theory and experiment verification. Zeeman effect – theory and experiment – Anomalous Zeeman effect – Stark effect (Qualitative only).

Unit – III

Introduction – Black body radiation – Planck's Quantum theory of absorption and emission – Limitations of classical theory – Dual nature of matter and radiation – De Broglie's hypothesis of matter waves – De Broglie's wavelength – Davisson's and Germer experiment – G.P. Thomson's experiment with relativistic correction.

Concept of packets for a quantum particle- group velocity and wave velocity & their relations – Heisenberg's uncertainity principle thought experiment illustration. Diffraction of electron through a single slit.

Unit – IV

Basic postulates of wave mechanics – Derivation of time dependent & time independent – Schrodinger wave equation – wave function – Physical significance of wave function – Probability density and expression fro probability current density – Eigen

function and-Eigen value – Energy function – Expection value – Normalization of wave function of simpler types – othtogonol and orthonormal properties of wave function.

Unit – V

Schrodinger equation for a free particles in one dimensional potential well, its eigen function and eigen values – Application of Schrodinger wave equation – Particle in one dimensional box – the barrier penetration problem (potential step) – Linear harmonic oscillator – Zero point energy.

Book for Study

1.	Quantumm Mechanics	–	R. Sathyaprakash, Ratan Prakasan Mandir - 1994
2.	Modern Physics	–	R. Murugesan, S. Chand&Co, 1998.
3.	Modern Physics	–	Seghal Chopra & Seghal Sultan, Chand,1998

Reference Books

1.	Quantum Mechanics	–	Gupta & Kumar Jay Prakash Nata & Co, 2007.
2.	Mechanics	–	D.S. Mathur, S. Chand & Co, 2002.

SEMESTER –V   NUCLEAR PHYSICS – CORE SUBJECT-6   CREDIT-4

Unit – I

Isotopes – Isotones – Isobars – Atomic mass unit – Propertics of the nucleus – Nuclear Binding Energy – Nuclear forces – Yukawa's theory (no derivations) – theories of nuclear composition – proton – electron hypothesis – Model of nuclear structure – the liquid drop model – Binding energy formula – Shell model – Collective model.

Unit – II

Particle Accelerators – Synchro-cyclotron – Betatron – proton synchrotron – electron synchrotron – detectors – Wilson cloud chamber – bubble chamber – photographic emulsion technique – fundamental particles – particles and antiparticules-particles instability – conservation laws.

Unit – III

Laws of radio activity – Half life period – Mean life – Radio Carbon dating – α rays – Geiger Nuttal law – experimental determination by Geiger Nuttal law – a disintegration energy – theory of α decay, β rays , β rays spectra –origin – neutrino theory of β decay – electron capture, γ rays - determination of wavelength by diamond crystal spectrometer – origin of rays – internal conversion.

Unit – IV

Nuclear transmutations by α particles, protons, deutrons, neutrons and electrons – Photo disintegration – nuclear fission – energy release. Explanation – (C.N. Cycle and P.P Cycle) Nuclear fusion – Thermo nuclear reaction – Controlled thermo nuclear reaction – Cosmic rays – origin – primary – secondary – Azimuthal effect – East-West effect pair production & annihilation – Van Allen Belt.

Unit – V

Utilisation of nuclear energy – principle and action of atom bomb & Hydrogen Bomb – production of electricity from energy – Nuclear reactors – General features of nuclear reactors – Different types of nuclear reactors – Pressurized water reactors – Boiling water reactors – Fast Breeder reactors – Radio isotopes and their application.

Book for study

1. Modern Physics – R. Murugesan, S. Chand & Co., 1998.
2. Modern Physics by Seghal, Chopra and Seghal, Sulltan Chand 1998.
3. Nuclear Physics by Keplan.I. – Marosa Publishing House, 1995.

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4. Atomic and Nuclear Physics – N. Subramanyan & Brijlal, S. Chand & Co,2000.

5. Modern Physics – R. Murugesan, S. Chand & Co, 1998.

Reference: Books

1. Prespectives of Modern Physics by Arther Beiser. Tata Mc Graw – Hill Kogakusha, Ltd.1969.

2. Fundamental University Physics Vol. III by Alonso and Finn. Addison – Wesley Publishing Co., 1968.

3. Nuclear Physics by D.C. Thayal – Himalaya Publishing House New Delhi, 1998.

4. Introduction to Modern Physics – Richtmayer, Kennard of Cooper Tata Mc.Graw Hill, 1998.

SEMESTER – V   ANALOG ELECTRONICS – CORE SUBJECT-7 CREDIT – 4

Unit – I

Thevenin's theorem – Norton'ss Theorem – Two port Network – Analysis – 'h' parameter only - Filter circuits – General theory – low pass, high pas, Band pass and band elimination filters.

Unit – II

Transistor – three type of configuration – relation between α, β, and γ – Load line (DC & AC) and operating point – Biasing circuits – base bias – collector feedback bias – Voltage divider bias – emitter bias – FET characteristics.

Unit – III

Small signal CE amplifier – calculation of voltage gain, current gain and power gain – input & output impedance using h parameter – frequency response of amplifier – Single stage amplifier – – push pull amplifier – OP AMP characteristics – application as adder, subtractor – integrator & differentiator.

Unit – IV

Feedback – Positive & Negative feedbacks – Barkhausen's criterion – transistor oscillators – Hartley , Colpitt & phase shift oscillator with mathematical analysis .

Unit – V

Modulation – types of modulation – amplitude modulation – modulated power output – modulation index – frequency modulation (qualitative) – digital modulation (qualitative) – block diagram of AM & FM transmitters.

Book for Study

1. Principles of Electronics   -   V.K. Metha- S. Chand & Co.,2002.
2. Basic Electronics   -   B.L. Theraja – S. Chand & Co.,2003.
3. Electronics Devices & Circuits- Salivahanan, Sureshkumar, Vallavaraj, Tata Mc Graw Hill- 2004.

Reference Books

1. Basic Electronics   -   A. Ubald Raj & G. Jose Robin 1998 Indira Publications

2. Elements of Solid State Electronics   -   Ambrose & Vincent Devaraj, Indira Publications 1994.

3. Basic Electronics   -   J.J. Bophy, Fourth Edition 1983, Mc Graw-Hill Book Company.

BIO MEDICAL INSTRUMENTATION
SKILL BASED- 5   (2Hrs)   CREDIT-2

Unit – I

Transducer – performance of characteristic of transducer – static and dynamic active transducers – (a) magnetic induction type (b) piezo – electro type (c) photo voltaic type (d) thermo electric type.

Unit – II

Passive transducer – (a) resistive type – effect and sensitivity of a bridge (b) capacitive transducer (c) linear variable different transformer –LVDT.

Unit – III

Characteristics of basic recording system – Origin Electro Cardio Graphy (ECG) – Block diagram – ECG leads – unipolar and bipolar –ECG recording setup.

Unit – IV

Electro Encephalo Graph (EEG) – Origin – Block diagram of EEG unit.- Electro Myograph (EMG) – Block Diagram EMG recoders.

Unit – V

Digital thermometer – Computer tomography (CT) principle – Block diagram of CT Scanner.

Book for Study

1.   Biomedical Instrumentation, ED II, 1994, Dr. M.Arumugam.
     Anuradha Agencies Revised Edition 1997.

Reference Books

1.   Hand Book of Biomedical Instrumentation, R.S. Khandpur, 1999, Tata Mc Graw Hill.

SEMESTER – VI   CLASSICAL AND STATISTICAL MECHANICS
CORE SUBJECT- 8   CREDIT-4

Unit – I

Frame of reference – Inertial frame of reference – Mechanics of particles – conservation of linear momentum – conservation of angular momentum – conservation of energy – Mechanics system of particles – conservation of linear momentum – conservation of angular momentum – conservation energy – work energy theorem – conservative forces – examples – constraints – Degrees of freedom under constraints – Forces of constraints – generalized velocities – generalized momentum.

Unit – II

Introduction – Principle of virtual work – D'Alembert's principle – Lagrangian equations of motion from D'Alembert's principle (Derivation) – Simple applications (simple pendulum, compound pendulum Atwood's machine) – Hamilton's principle and Lagrangian's equation of motion from Hamilton's principle – Deduction of Hamilton's principle from D'Alembert's principle – Deduction of Lagrangian's equation of motion using variation principle for system involving forces – derivable from potential function- simple application (simple pendulum, compound pendulum, Atwood's machineand Harmonic Oscillation one dimension) – Superiority of Lagrangian approach over Newton's approach.

Unit – III

Introduction – Cyclic co-ordinates Hamiltonian function H- Physical significance – Hamilton's equation of motion (derivation) – variational principle – Hamilton's equations of motion from variational principle – Hamilton's equations of motion in different coordinate systems – Simple applications (Harmoni oscillator, compound pendulum, Motion of a particle in central force field).

Unit – IV

Microscopic and Macroscopic systems – Ensembles - Phase space – Probability – Basic Postulates of statistical mechanics – Definition of Mathematical probability – Thermo dynamic probability – Boltzmann's theorem on entropy and probability – statistical equilibrium – Maxwell-Boltzmann statistics – Maxwell-Boltzmann energy distribution law – Maxwell-Boltzmann's velocity distribution law.

Unit – V

Bose-Einstein statistics – Bose-Einstein distribution law – Photon gas – Planck's law of black body radiation (Derivation) – Deduction of Wien's and Rayleigh – Jean's law of black body radiation – Fermi-Dirac statistics – Fermi-Dirac distribution law- Electron gas – Fermi energy in crystalline solids – comparison between the three statistics.

Books for Study

1. Thermodynamics, Kinetic theory and statistical thermodynamics by F.W. Sears and G.L. Salinger, Narosa Publishing House, New Delhi 1986.
2. Statistical Physics and Thermo dynamics by Agarwal , S. Chand & Co., New Delhi 1996.

Reference Books

1. Theoretical Mechanics – Schaum series, Tata Mcgraw Hill Publishers Company Ltd., New Delhi 1998.
2. Classical Mechanics by Goldstein, Narosa Publishing Hous, New Delhi 1998.
3. Classical Mechanical by Biswas Books and Allied (P) Ltd., Calcutta 1999.
4. Thermodynamics, Kinetic theory and statistical thermodynamics by F.W. Sears and G.L. Salinger, Narosa Publishing House, New Delhi 1986.
5. Classical Mechanics by J.C. Upadhya Himalaya Publishing House, Delhi, Bangalore, Hyderabad 1999.
6. Statistical Physics and Thermo dynamics by Agarwal . S. Chand & Co., New Delhi 1996.

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SEMESTER – VI   MATERIAL SCIENCE – CORE SUBJECT-9   CREDIT-4

Unit – I

Bonding in Solids – Types of bonding in solids –ionic, covalent, metallic , molecular and hydrogen bonds – Crystal Structure – Crystal lattice and crystal structure – unit cell – Bravi's lattice , classification of crystals -, Miller indices – structure of diamond and zinc blende – Thermal Properties – Concept of phonon – Heat capacity of solids – Limitations of Einstein's theory, Debye's theory of lattice specific heat ; thermal expansion of solids (qualitative).

Unit – II

Free electron theory of metals; Electron drift, mobility, mean free path, relaxation time; Electrical and Thermal conductivities of metals – Wiedmann Franz law; Sources of resistivity of metals – Matthiessen's rule ; Super conductivity – applications , BCS theory.

Unit – III

Different types of magnetism – dia, para, ferro, antiferro and ferimagnetism: 1. LAngevin's theory of dia & para magnetism 2. Wie's theory of ferromagnetism – Magnetic materials – Properties and application – hard and soft magnetic materials, magnetostriction materials, ferrites and concept of domains and hysterisis.

Unit – IV

Dielectrics , polarization , polar and non-polar dielectrics – dielectric constanr, Polarisability Clausius Mossotti relation – Different types of Polarization – electronic, ionic, orientational, space charge – Dependence of polarization on frequency and temperature; Dielectric loss sources; Dielectric strength and break-down – contributing factors.

Unit – V

Laser materials – Instrumentation of radiation with matter (qualitative) – Emission and absorption of light spontaneous and stimulated emission; Laser-Principle – Properties – applications; construction, working and characteristics of Ruby laser, He-Ne laser, Semiconductor laser.

Book for Study

1.   Fundamentals of Solid state physics by Saxena, Gupta Saxena – Pragati Prakashan X Revised Edition 1991.

2.   Introduction to Solids by Azaroff – TMH , Reprint 1978.

Reference Books

1.   Solid State physics by R.K.Puri & V.K. Babbar – Chand&Co, I Edition, 1997.

2.   Material Science by. M. Arumugam – Anuradha Agencies Revised Edition, 1997.

3.   Modern Physics by R. Murugesan – Chand & Co., XI Revised Edition 2003.

4.   Fundamentals of Solid state physics by Saxena, Gupta Saxena – Pragati Prakashan X Revised Edition 1991.

5.   Principles of the solid state by H.V. Keer – Wiley Eastern Ltd., I Edition 1993.

6.   Introduction to solids by Azaroff – TMH, Reprint 1978.

SEMESTER-VI   DIGITAL ELECTRONICS – CORE SUBJECT -10   CREDIT-4

Unit – I

Number system – Binary, decimal , Octal , hexadecimal – Conversion from one another – Binary addition, subtraction, multiplication, division – Binary subtraction by 1's and 2's complement – Basic laws of Boolean Algebra – Boolean Addition – properties of Boolean Algebra – Principle of Duality – De Morgan's theorems – their proof.

Unit – II

Positive and Negative logic – Logic gates – OR, AND ,NOT, NOR NAND and EX-OR- Universal gates – Logic families – Diode Resistor logic (DRL) – OR gate, AND gate – RTL NOT gate – DTL NOR, TTL NOR – DTL NAND – Sum of products(SOP) – expression from a truth table Karnaugh map – 2variable , 3variable and 4 variable – simplification using K-map.

Unit – III

Half adder – Full adder – 4bit binary adder – Half subtractor – Full subtractor – 4 bit parallel subtractor – Multiplexer (MUX) – 4 to 1 MUX De multiplexer (DMUX) – 1 to 4 DMUX – Encoder – 8 to 3 encoder – Decimal to BCD encoder – Decoder – 3 to 8 decoder, BCD to decimal decoder – BCD to seven segment decoder.

Unit – IV

Timer – IC 555 mono and astable multivibrators – Flip Flops – R-S Flip flops-clocked R-S flip flop- J-K flip flop – J-K master Slave flip flop – D flip flop- application of flip flops.

Unit – V

Register – Shift register – Classification – Serial in – Serial out (SISO) shift register- Counters – Ring Counter, 4 bit binary ripple counter – decade counter – Digital to Analog converter (D/A) – Binary ladder type – Analog to Decimal converter (A/D)- Successive approximation type.

Book for Study

1. Digital Principles and applications 6th Edition ; Leech , Malvino and Saha. Fourth Edition Tata Mc-Graw Hill 1996.
2. Digital Fundamentals; V. Vijayendran , S. Viswanathan Publication – 2007.
3. Fundamentals of Digital Electronics and Micro Processor, S. Chand & Co.,2005.

Reference Books

1. Introduction to Integrated Electronics Digital and Analog , V. Vijeyandran, S.Viswanathan Publication .2007.

2. Electronics Devices and Circuit ; Salivaganan, Suresh Kumar and Vallavaraj Tata Mc-Graw Hill -2006. (23rd print).

SEMESTER – VI   OPTO ELECTRONICS SKILL BASED-6 (2Hrs) CREDIT-2

Unit – 1

Introduction – PN junction as a Light Source (LED) – LED materials – Advantages – LCD – characteristics and action of LCD- Advantages.

Unit – II

Laser – Introduction – characteristics of Laser – spontaneous and stimulated emission – Einstein coefficients – condition for population inversion – three level scheme – semiconductor laser.

Unit – III

Photo detector – characteristics of photodetectors – PN junction photo detector – PIN photo diode – Avalanche photo diode – Photo transistor.

Unit – IV

Introduction – principle of optical fibre – light transmission in a optical fibre – Acceptance angle – Numerical aperture.

Unit – V

Fibre index profiles - Step index, graded index fibre (transmission of signals) – Advantages of fibre optic communications, optical switching – logic gates.

Book for Study

1. Semiconductor physics and opto electronics – P.K. Palanisamy, SCITECH Publication, Chennai 2002.
2. Optical dibres and Fibre Optic Communication – Sabir Kumar Sarkar IV Revised Edition 2003.

Reference Books

1. Opto Electronics – Wilson & Hawker, Prentice Hall of India 2004.

LILST OF EXPERIMENTS

FIRST YEAR   SEMESTER I AND II   PRACTICAL – I   CREDIT-4

EXAM:3Hrs

1.	Young's Modulus	-	Uniform bending (Pin & Microscope)
2.	Young's Modulus	-	Non-Uniform bending – Optic lever
3.	Young's Modulus	-	Canti lever – Pin and Microscope
4.	Young's Modulus	-	Canti lever – Dynamic method
5.	Regidity Modulus	-	Static Torsion – Searl's method
6.	Regidity Modulus	-	Torsion Pendulum with loads
7.	Moment of Inertia	-	Torsion Pendulum
8.	A.C. Frequency	-	Sonameter
9.	Melde's apparatus	-	Frequency of Vibrator
10.	Thermal conductivity of Bad Conductor	-	Lee's disc.
11.	C.F. Bridge	-	Resistance and specific Resistance
12	C.F. Bridge	-	Temperature Coefficient
13.	Potentiometer	-	Calibration of low range Voltmeter
14.	Potentiometer	-	Calibration of Ammeter
15.	Compound Pendulum	-	"g"

SECOND YEAR   SEMESTER III AND IV   PRACTICAL-II   CREDIT-2

EXAM:3Hrs

1.	Determination of M and B_H	-	Tan C Method
2.	Determination of B_H	-	Axial coil
3.	Determination of M	-	Axial Coil
4.	Potentiometer	-	Temp. Co efficient
5.	Potentiometer	-	Comparison of EMF's
6.	Table Galvanometer	-	Figure of Merit
7.	Spot Galvanometer	-	Figure of Merit
8.	Spot Galvanometer	-	Charge Sensitiveness
9.	Owen's Bridge	-	C_1/C_2
10.	De Sauty's Bridge	-	C_1/C_2
11.	Spot Galvanometer	-	Comp. of EMF's
12.	Spot Galvanometer	-	Comp. of Capacities
13.	Refractive Index	-	Spectrometer A and D
14.	Grating	-	N and λ
15.	Air Wedge	-	Thickness of Wire
16.	Newton's Rings	-	Radius and Wavelength Measurements

FINAL YEAR   SEMESTER V AND VI   PRACTICAL-III   GENERAL

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2HRS. DURATION

CREDIT-5

EXAM:3HRS

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1.	Small angled Prism	-	Ref. Index
2.	Spectrometer	-	i-i'
3.	Grating	-	Minimum Deviation Method
4.	Spectrometer	-	Cauchy's Constants
5.	Spectrometer	-	Hartmann's Interpolation formula
6.	L.C.R.	-	Series Resonance Circuit
7.	L.C.R.	-	Parallel Resonance Circuit
8.	S.G.	-	Determination of M.MutualInduction
9.	S.G.	-	Comparison of Mutual Inductances
10.	Anderson's Bridge	-	Self Inductances
11.	Rayleigh's Bridge	-	Self Inductances
12.	Maxwell's Bridge	-	Self Inductances
13.	Spot Galvanometer	-	High Resistance by Leakage
14.	S.G.	-	Internal Resistance of a cell
15.	Impedance and Power factor	-	L.R. Circuit
16.	Impedance and Power factor	-	C.R. Circuits

PRACTICAL-IV   SEMESTER V AND VI   ELECTRONICS I   CREDIT-5
                                                       DURATION:3HRS

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RATION
REDIT-5
M:3HRS

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Induction
ctances

1.	Zener diode	- Characteristics
2.	Transistor	- Characteristics C.E. Mode
3.	FET	- Characteristics
4.	Full wave Rectifier	- Π Filter
5.	Bridge Rectifier	- Π Filter
6.	Zener	- Voltage Regulator
7.	I.C.	- I.C. 7805 Regulated power supply
8.	Single Stage Amplifier	- Gain and Bandwidth
9.	Two Stage Amplifier	- Without feedback – Gain and bandwidth
10.	Two Stage Amplifier	- With Feedback – Gain and bandwidth
11.	Hartley Oscillator	- Frequency and Inductance of pair of coils
12.	Colptt's Oscillator	- Frequency and Inductance
13.	Astable MultiVibrator	- Discrete Components only
14.	Clipper and Clamper	- Discrete Components only
15.	Integrator and Differentiator	- Discrete Components only
16.	Logic Gates	- Discrete Components only

PRACTICAL V   SEMESTER V AND VI   ELECTRONICS II CREDIT-5

DURATION:3HRS

1. Dual Power Supply
2. Voltage Doubler and Tripler
3. OPAMP - Integrator and Differentiator
4. OPAMP - Adder and Subtractor
5. Astable Multivibrator - OPAMP
6. Astable Multivibrator - I.C. 555
7. Schmitt Trigger - I.C. 555
8. Universal NAND Gate - I.C.
9. Universal NOR Gate - I.C.
10. Half Adder, Full Adder
11. Four Bit Binary Adder
12. Shift Register
13. Ring Coounter
14. 4 Bit Binary Counter
15. BCD Counter
16. 4 Bit Binary Subtractor

B.Sc., ANCILLARY PHYSICS (SEMESTER) SYLLABUS

1. **Subjects of Study and Scheme of Examination:**

   The subjects offered in Ancillary Physics for two years (four semesters) and the scheme of examination are given.

2. **Question Paper Pattern:**

   The internal and external marks is 25:75

External

The existing pattern of Question paper will be as follows:

Time : 3Hrs

Max Marks:75

Section A: (10X1=10Marks)

Question No. 1 to 10 (Multiple Choice)

4. Two questions from each unit

5. Four choices in each question

6. No "none of these" choice.

Section B: (5X7=35Marks)

Answer all questions choosing either (a) or (b)

Answer not exceeding two pages.

(One question from unit)

Question No.: 11-15	11 (a) or	11(b)
	12(a) or	12(b)
	13(a) or	13(b)
	14(a) or	14(b)
	15(a) or	15(b)

DETAILS OF B.Sc., ANCILLARY PHYSICS PAPERS – YEAR WISE

S.No	Title of the Paper	Subject Code	Year of Study	Semester of Study	Exam Hour	Max. Marks	Min Marks for Pass	Hours per Week	Credit
1.	Mechanics Properties of matter and Sound		I/II	1	3	100	35	4	4
2.	Thermal Physics		I/II	2	3	100	35	4	4
3.	Practical 1		I/II	End of the year	3	*100	35	2	1
4.	Electricity and Electronics		II/III	3	3	100	35	4	4
5.	Optics, spectroscopy and Modern Physics		II/III	4	3	100	35	4	4
6.	Physics Practical II		II/III	End of the year	3	*100	35	2	1
	Total					600			18

5 marks

:wo tests.

Total Marks
10
35
30

Practical

Each student should submit the practical records at the time of practical examination. The maximum marks of 100 for the practical will be allotted as follows.

Practical record note/(Internal)	-	10+30 = 40
Practical examinations	-	= 60

		100

B.Sc., ANCILLARY PHYSICS (SEMESTER) SYLLABUS

SEMESTER-I   **(4HRS)**   **CREDIT- 4**

PAPER I: MECHANICS, PROPERTIES OF MATTER AND SOUND

Unit I:

Forces in nature – Central forces – Gravitational and electromagnetic – Conservative and Non-Conservative forces – Examples – Nuclear force – Friction- Angle of friction - Motion of bodies along an inclined plane – Work done by a force – Work done by a varying force – Expression for Kinetic energy – Expression for potential energy – Power.

Unit II

Angular velocity – Normal acceleration (no derivation) – Centrifugal and Centripetal forces – Torque and angular acceleration – Work and power in rotationa motion – Angular momentum – K.E. of rotation – Moment of Inertia – Laws of paralle and Perpendicular axes theorems- M.I. of circular ring, Solid sphere, hollow sphere and cylinder.

Unit III

Kepler's laws of planetary motion – Laws of Gravitation – Boy' method for G - Compound pendulum – Expression for period – Experiment to find g – Variation of g with latitude , altitude and depth – Artificial Satellites.

Unit IV

Elastic moduli – Poisson's ratio – beams – Expression for bending moment Determination of Young's modulus by uniform and non-uniform bending – I section o girders. Torsion – Expression for couple per unit twist – Work done in twisting - Torsional pendulum – Derivation Poiseuille's formula (analytical method) – Bernoulli': theorem – Proof Application – Venturimeter – Pitot tube.

lectromagnetic –
Friction- Angle
y a force – Work
r potential energy

Centrifugal and
wer in rotational
- Laws of parallel
ollow sphere and

' method for G –
ariation of g with

nding moment –
ng – I section of
ne in twisting –
od) – Bernoulli's

Unit V

Simple harmonic motions – Progressive Waves properties – Composition of Two S.H.M. and beats Stationary Waves – Properties – Melde's experiments for the frequency of electrically maintained tuning fork – Transverse and longitudinal modes – Acoustics – Ulrasonics – Properties and Applicationsl.

Reference Books

1. Mechanics by D.S. Mathur – S. Chand & Co., 2008.
2. Properties of matter by Brijlal & N. Subramanyam 2004, S. Chand.
3. A Text Book of Soud by Brijlal & N. Subramanyam, S. Chand & Co 2004.
4. University Physics by Sears Zemansky and Gound , 6th edition (Naresa Publishing House , Chennai 1996)

SEMESTER II   **PAPER –II THERMAL PHYSICS**   **CREDIT-4**

Unit – I

Expansion of Crystals – Determination of α by air wedge method – Expansion of antiotropic solids – solids of low expansivity and their uses – anomalous expansion of water – thermostats. Isolated and adiabatic changes – Derivation of equation for both C_v, and C_p of a gas – relation between them – experimental determination of C_v, by Joly's method- Determination of C_p by Regnault's method.

Unit – II

Lee's disc method for conductivity of bad conductor – air and cardboard/ ebonite – analogy between heat flow and electric current Wiedmann –Franz law – Convection in atmosphere – laps rate – stability of atmosphere – green house effect – atmospheric pollution.

Unit – III

Radiation – Stefan's law – determination of Stefan's constant by filament heating method – solar constant measurement water flow Pyrheliometer – temperature of the Sun – Solar spectrum – energy distribution in black body spectrum – Planck's law (no derivation) – derivation of Wien's and Rayleigh Jeans laws from Planck's law.

Unit – IV

Kinetic theory of gases – Mean free Path – transport phonomena – diffusion , viscosity and thermal conductivity – Maxwell's law of distribution of molecular speed-experimental verification –degree of freedom – Boltzman's law of equipartition of energy – calculation of Cp for monoatomic and diataic gases.

Unit - V

Thermodynamics – Carnot's theorem – Derivation of Efficiency – Second law of thermodynamics – entropy – changes of entropy in Carnot's cycle – Change of entropy in conversion of ice into steam – Joule – Kelvin effect – simple theory of Porous – Plug experiment adiabatic – diamagnetism – Curie's law Giauque's Method Superconductivity.

Reference Books

1. Heat and Thermodynamics by Brijlal & N. Subramanyam – S. Chand & Co. 2004,

2. Ancillary Physics Vol.II by A. Ubald Raj & Jose Robin, Indira Publications, 2002..

SEMESTER III   PAPER III   ELECTRICITY AND ELECTRONICS

CREDIT-4

Unit - I

Gaus's law – proof – Applications – Field due to a charged sphere and an infinite plane sheet – Field near a charged conducting cylinder – Coloumb's theorem – Electronic potential – Relation between potential and field – Capacitors – Expression for C of parallel plate spherical (outer sphere earthed) and cylindrical capacitors – Energy of charged capacitor – Loss of energy due to sharing of charges.

Unit – II

Kirchoff's laws – application of wheatstone's network – sensitiveness of bridge – Crey Foster Bridge – Measurement of resistance and temperature Coefficient of resistance – principle of potentiometer – Calibration of ammeter and voltmeter – low and high range – measurement of resistance using potentiometer.

Unit – III

Torque on a current loop – mirror galvanometer, dead beat and ballistic – Current sensitiveness – voltage sensitiveness I B.G. theory – damping correction – experiments for charge sensitiveness – comparison of emf's and comparison of capacitors.

Electro motive force generated in a coil rotating in a uniform magnetic field – R.M.S. and mean values – LCR circuit - impedances – Series and Parallel resonant circuits – Power factor – Wattless current – Choke.

Unit – IV

Junction diodes – Froward and Reverse bias – Diode characteristics – Types of diodes – (LED and Zener) Bridge rectifier using junction – II filter – Transistors – Characteristics (CE modes only) – Biasing and action of a single transistor (CE) amplifier – Frequency response Hartley oscillator – Modulation (qualitative study) – OPAMP and its characteristics - virtual earth – voltage amplifier in inverting mode – OpAmp as adder and Subtractor.

Unit – V

Binary number system – reason for using binary numbers – binary to decimal and decimal to binary conversions – addition and subtraction of binary numbers. Logic circuits – Boolean algebra – De Morgan's theorem – OR,AND ,NOT,NOR and NAND Gates – NOR and NAND gates as universal building blocks – Ex-Or gates.

Reference Books:

1. Solid State Electronics – B.L. Theraja S.Chand 2003.
2. Electricity and Magnetism – Brijlal & N. Subramanyam S.Chand 2007

SEMESTER IV   PAPER IV   OPTICS, SPECTROSCOPY AND MODERN PHYSICS   CREDIT-4

Unit - I

Deviation produced by thin lens – Focal length of two thin lenses in and out of contact – Cardinal points – Refraction through a thin prism – Dispersion – Dispersive power – combination of thin prisms to produce (a) deviation without dispersion and (b) dispersion without deviation – Direct vision spectroscope – Chromatic aberration in lenses and its removal – Spherical aberration and its removal – Aplanatic surfaces – Oil immersion objective – Theory of primary and secondary rainbows.

Unit – II

Interference in thin films – Air wedge – Newton's rings (Reflected beam only) – Determination of wavelength – Jamin's Interferometer, principle and use. Diffraction; Theory of plane transmission grating (Normal incidence only) – Experiment to determine wavelengths.

Unit – III

Double refraction – Nicol prisms, constructions, action and uses – QWP and HWP- Optical activity (No theory) – Biot's laws – Specific rotatory power – Half shade polarimeter – Determination of Specific rotatory power – Fiber optics – Light propagation in fibers – Fiber optic communication system.

Unit – IV

Infra red radiations, Production, properties and uses – Ultra violet radiations sources, properties and uses. **Quantum theory** – Plank's quantum theory – Raman Effect – Simple theory Experimental study (Wood's apparatus) Application. **Photo electricity** – Laws of photo electricity – Einstein's equation Photocells and their uses, photo emissive, photoconductive and photovoltaic cells.

Unit – V

De Broglie's theory – Electron diffraction – G. P. Thomson's experiment. Michelson – Morley experiment – Significance of the negative results – Postulates of special theory of relativity – Lorentz transformation equations (No Derivation)- Length Contraction – Time dilation – Variation of mass with velocity and Mass – Energy relation (Simple derivation).

Reference Books:

1. A text book of Optics by Brijlal & N. Subramanyam, S.Chand 2002.
2. Optics and Spectroscopy by R. Murugesan, Vivekananda Press, Madurai 2004.

ANCILLARY PHYSICS PRACTICALS – I

END OF SEOCND SEMESTER   CREDIT-1

Any 14 Experiments:

1. Non Uniform Bending- Optic lever.
2. Uniform bending – Pin and microscope
3. Compound pendulum – Determination of 'g'
4. Torsion Pendulum – determination of M.I. and G
5. Thermal conductivity of Card Board – Lee's Disc method.
6. Melde's String – Frequency of fork.
7. Sonometer – Verification of laws
8. Calibration of Voltmeter (low range) – Potentiometer
9. Calibration of Ammeter – Potentiometer
10. Resistance and resistivity – Potentiometer
11. Comparison of Capaci.ances – B.G./Spot Galvanometer method.
12. Comparison of emf's – B.G / Spot Galvanometer Method
13. Carey Foster Bridge – resistance & resistivity of a wire
14. Spectrometer µ of Prism
15. Comparison of Co efficient of Viscosities by Ostwald's Viscometer.
16. Co-efficient of viscosity – Stoke's method.

END OF FOURTH SEMESTER   CREDIT-1

Any 14 Experiments:

1. Mirror Galvanometer – Voltage and current sensitiveness
2. L.C.R. – Series resonance – determination of L & Q factor
3. Air wedge – Thickness of a wire
4. Dispersive power of a prism – Spectro.neter
5. Grating N by λ Normal incidence – Spectrometer
6. Newton's rings – Determination of radius of curvature
7. Bridge rectifier II filter
8. Transistor Static characteristics C.E mode.
9. Single Stage transistor amplifier.
10. Hartley Oscillator
11. Logic Gates – AND. OR. NOT – truth table verification- discrete components.
12. Logic Gates – NAND. NOR , truth table verification – discrete components.
13. Zener diode characteristics & Break down Voltage
14. OP AMP as an adder and Subtractor.
15. Comparison of Capacitances – Desauty's method using headphone
16. L.C.R. – Parallel resonance.