SRI SANKARA ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

ENATHUR, KANCHIPURAM – 631 561
CHOICE BASED CREDIT SYSTEM

DEPARTMENT OF PHYSICS
B.Sc. DEGREE COURSE IN PHYSICS
REGULATIONS
(With effect from the academic year 2015-2016)

1. ELIGIBILITY FOR ADMISSION:

Candidates for admission to the first year of the Degree of Bachelor of Science courses shall be required to have passed the Higher Secondary Examinations (Academic or Vocational Stream) conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereof by the Syndicate of the University of Madras. Provided that candidates for admission into the specific main subject of study shall be Possess such other qualifying conditions as may be prescribed by the University as given in the **APPENDIX-A.**

2. ELIGIBILITY FOR THE AWARD OF DEGREE:

A candidate shall be eligible for the award of the Degree only if he /she has undergone the prescribed course of study in a College affiliated to the University for a period of not less than three academic years, passed the examinations all the Six-Semesters prescribed earning 140 Credits (in Parts-I, II, III, IV & V).

3. DURATION:

a) Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third and fourth semesters and the third academic year the fifth and sixth semester respectively.

b) The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

4. COURSE OF STUDY:

The main Subject of Study for Bachelor Degree Courses shall consist of the following and shall be in accordance with **APPENDIX-B**

PART – I   TAMIL / OTHER LANGUAGES

PART – II   ENGLISH

PART – III   CORE SUBJECTS

       ALLIED SUBJECTS

       PROJECT/ELECTIVES WITH THREE COURSES

PART – IV

1.(a)   Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two course (level will be at 6th Standard).

(b)   Those who have studies Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Advanced Tamil comprising of two courses.

(c)   Others who do not come under a + b can choose non-major elective comprising of two courses.

2.   SKILL BASED SUBJECTS (ELECTIVE) - (SOFT SKILLS)

3.   ENVIRONMENTAL STUDIES

4   VALUE EDUCATION

PART – V   EXTENSION ACTIVITIES

5. EXTENTION ACTIVITIES:

A candidate shall be awarded a maximum of 1 Credits for Complusory Extension Service.

All the Students shall have to enrol for NSS /NCC/ NSO (Sports & Games) Rotract/ Youth Red cross or any other service organizations in the college and shall have to put in Complusory minimum attendance of 40 hours which shall be duly certified by the Principal of the college before 31st March in a year. If a student LACKS 40 HOURS ATTENDANCE in the First year, he/she shall have to compensate the same during the subsequent years.

Students those who complete minimum attendance of 40 hours in One year will get HALF A CREDIT and those who complete the attendance of 80 or more hours in Two Years will ONE CREDIT.

Literacy and population Education Field Work shall be compulsory components in the above extension service activities.

6. SCHEME OF EXAMINATION:

Scheme of Examination shall be given in **APPENDIX - C**

Model Scheme

Course Component Name of the course	Inst. Hour	Credits	Exam Hours	Max. Marks		
				Ext.mark	Int. mark	Total
PART-I **Language**				75	25	100
PART-II **English**				75	25	100
PART-III **Core subject :**				75	25	100
Core Subject				75	25	100
Allied Subject				75	25	100
PART – IV 1.(a) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two course (level will be at 6th Standard). (b) Those who have studies Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Advanced Tamil comprising of two courses. (c) Others who do not come under a + b can choose non-major elective comprising of two courses.						
2*Skill based subjects(Elective) – (Soft Skill)						

The following procedure be be followed for Internal Marks:

Theory Papers: Internal Marks   25

        INTERNAL MARKS

Tests (2 out of 3)	= 10
Attendance	= 5
Seminars	= 5
Assignments	= 5
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	25 marks

Break-up Details for Attendance

Below 60%	- No marks
60% to 75%	- 3 marks
76% to 90 %	- 4 marks
91% to 100%	- 5 marks

Practical: Internal Marks   40

Attendance	5 marks
Practical Test best 2 out of 3	30 marks
Record	5 marks

Project:

Internal Marks best 2 out of 3 presentations	20 marks
Viva	20 marks
Project Report	60 marks

7. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER:

i. Candidates shall register their names for the First Semester Examination after the admission in UG Courses.

ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) Semester Subjects.

iii. Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed therefor by the Syndicate from time to time.

Provided in case of a candidate earning less than 50% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorised Medical Attendant (AMA), duly certified by the Principal of the college, shall be permitted to proceed to the next semester and to complete the Course of study. Such Candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the University from time to time.

8. PASSING MINIMUM:

A candidate shall be declared to have passed:

a) There shall be no Passing Minimum for Internal.
b) For External Examination, Passing Minimum shall be of 40% (Forty Percentage) of the maximum marks prescribed for the paper for each Paper/Practical/Project and Viva-voce.
c) In the aggregate (External + Internal) the passing minimum shall be of 40% .
d) He/She shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in Parts-I, II, III, IV & V. He/she shall also fulfill the extension activities prescribed earning a minimum of 1 Credit to qualify for the Degree.

9. CLASSIFICATION OF SUCCESSFUL CANDIDATES:

PART- I TAMIL / OTHER LANGUAGES

TAMIL/OTHER LANGUAGES: Successful candidates passing the Examinations for the Language and securing the marks (1) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD Class.

PART – II ENGLISH

ENGLISH: Successful candidates passing the examinations for English and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND Class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD class.

PART – III consisting of CORE SUBJECTS,   ALLIED SUBJECTS, PROJECT / ELECTIVE with three courses:

Successful candidates passing the examinations for Core Courses together and securing the marks (i) 60 percent and above (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core courses together shall be declared to have passed the examination in the FIRST and SECOND Class respectively. All other successful candidates shall be declared to have passed the examinations in the Third Class.

PART – IV (consisting of sub items 1 (a), (b) & (c), 2, 3 and 4) as furnished in the Regulations 4 Part-IV supra.

PART – V EXTENTION ACTIVITIES:

 Successful Candidate earning of 1 credit SHALL NOT BE taken into consideration for Classification/Ranking/ Distinction.

10. RANKING:

Candidates who pass all the examinations prescribed for the course in the FIRST APPEARANCE ITSELF ALONE are eligible for Ranking/ Distinction.

Provided in the case of Candidates who pass all the examinations prescribed for the Course with a break in the First Appearance due to the reasons as furnished in the Regulations. 7 (iii) supra are only eligible for classification.

11. TRANSITORY PROVISION:

Candidates who have undergone the course of study prior to the academic year 2008 – 2009 will be permitted to appear for the examinations under those Regulations for a period of TWO years i.e. up to and inclusive of April/May 2012 Examinations. Thereafter, they will permitted to appear for the examination only under the Regulations then in force.

Question Paper Pattern

SECTION – A (30 words)

      10 OUT OF 12   -   10 X 2 marks   = 20 marks

SECTION – B (200 words)

      5 out of 7   -   5 x 5 marks = 25 marks

SECTION – C (500 words)

      3 out of 5   -   3x 10 marks = 30 marks

                      TOTAL   **=**   **75 marks**

QUESTION PAPER FOR PRACTICALS

      The external examiner will prepare a question paper on the spot with the help of the Question Bank supplied by the Controller's office.

APPENDIX – A ADDITIONAL ELIGIBILITY CONDITIONS FOR ADMISSION TO THE FOLLOWING COURSES

(1)   CANDIDATES FOR ADMISSION TO THE FOLLOWING COURSES SHALL HAVE PASSED THE QUALIFYING EXAMINATION WITH THE SUBJECTS NOTED AGAINST EACH:

(i)	BIOCHEMISTRY	:	ANY SCIENCE GROUP
(ii)	COMPUTER SCIENCE	:	COMPUTER SCIENCE/ MATHEMATICS/STATISTICS/ BUSINESS MATHEMATICS
(iii)	CLINICAL NUTRITION AND DIETETICS	}	
(iv)	NUTRITION FOOD SERVICE MANAGEMENT AND DIETETICS}	}:	CHEMISTRY
(v)	ELECTRONICS SCIENCE	:	MATHEMATICS/PHYSICS
(vi)	MARINE SCIENCE	:	BIOLOGY
(vii)	MATHEMATICS	:	MATHEMATICS / PHYSICS CHEMISTRY/STATISTICS/ COMPUTER SCIENCE
(viii)	MICROBIOLOGY	:	BIOLOGY / BOTANY / ZOOLOGY
(ix)	PHYSICS	:	MATHEMATICS / PHYSICS

(x)	STATISTICS	:	STATISTICS/MATHEMATICS
(xi)	SOFTWARE ENGINEERING	:	MATHEMATICS/PHYSICS

(2) B.SC DEGREE COURSE IN NAUTICAL SCIENCE:

Candidates for admission to the First Year of the Degree of Bachelor of Science Course in Nautical Science shall be required to have passed the Higher Secondary Examination conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate of this University with a minimum of 60 % aggregate marks in Physics, Chemistry, and Mathematics but not less than 50% in any of the Subjects separately and minimum of 50% in English.Candidates are also required to pass an Entrance Test except by those who have qualified I.I.T. / J.E.E Tests.

PROVISION FOR LATERAL ADMISSION FOR BACHELOR OF COMPUTER APPLICATION (B.C.A)

Candidates with Diploma (3 years) in Computer Science and Engineering or Electrical and Electronics Engineering or Electronic and Communication Engineering awarded by Director of Technical Education, Government of Tamil Nadu or any other Diploma as equivalent thereto, shall be admitted to the Second year of the B.C.A Degree Course.

APPENDIX - B

COURSE OF STUDY

The Course of Study shall comprise the study of Part-I to Part-V Courses; .

PART - I   TAMIL/OTHER LANGUAGES comprise the study of:

Tamil or any one of the following Modern (Indian or Foreign) or classical languages at the optional candidate, according to the syllabi and text-books prescribed from time to time.

(i)	Modern (Indian)- Telugu, Kannada, Malayalam, Urdu & Hindi.
(ii)	Foreign -Chinese, French, German, Italian, Japanese, & Russian
(iii)	Classical - Sanskrit, Arabic & Persian.

AND

PART – II   ENGLISH according to the syllabi and text-books prescribed from time to time.

PART – III   CORE COURSES Comprise the study of (A) Main Subjects; (B) Allied Subjects;

(C) Project / Electives with three courses:

(A) MAIN SUBJECTS:

Each candidate shall choose any one of the following Main Subjects [core courses] under the FACULTY OF SCIENCE:

01. B.Sc.   ADVANCED ZOOLOGY AND BIOTECHNOLOGY
02. B.Sc.   BIOCHEMISTRY
03. B.Sc.   BIOTECHNOLOGY
04. B.Sc.   CHEMISTRY
05. B.Sc.   COMPUTER SCIENCE
06. B.Sc.   ELECTRONICS AND COMMUNICATION SCIENCE
07. B.Sc.   HOTEL AND CATERING MANAGEMENT
08. B.Sc.   CLINICAL NUTRITION AND DIETETICS
09. B.Sc.   INTERIOR DESIGN AND DÉCOR
10. B.Sc.   NUTRITION, FOOD SERVICE MANAGEMENT & DIETETICS
11. B.Sc.   MATHEMATICS
12. B.Sc   MICROBIOLOGY
13. B.Sc   NAUTICAL SCIENCE
14. B.Sc.   PHYSICS
15. B.Sc.   PLANT BIOLOGY AND PLANT BIOTECHNOLOGY
16. B.Sc   PSYCHOLOGY
17. B.Sc   SOFTWARE ENGINEERING
18. B.Sc   ZOOLOGY
19. B.C.A. BACHELOR OF COMPUTER APPLICATIONS
20. B.Sc. ELECTRONIC MEDIA
21. B.Sc. VISUAL COMMUNICATION
22. **Syllabi for Allied subjects in Statistics for BA/BSc degrees**

(B)   ALLIED SUBJECTS:

Each candidate shall choose the Allied subjects prescribed in the Scheme of Examinations.

(C) PROJECT / ELECTIVES with Three Courses

PART – IV

1.(a)   Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two course (level will be at 6th Standard).

(b)   Those who have studies Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Advanced Tamil comprising of two courses.

(c)   Others who do not come under a + b can choose non-major elective comprising of two courses.

2.   SKILL BASED SUBJECTS (ELECTIVE) - (SOFT SKILLS)

3.   ENVIRONMENTAL STUDIES

4   VALUE EDUCATION

PART – V   EXTENSION ACTIVITIES

SYLLABUS
(With effect from the academic year 2015-2016)

B.Sc. DEGREE COURSE IN PHYSICS

SEMESTER – I

CORE PAPER – 1
MECHANICS AND PROPERTIES OF MATTER

UNIT 1 : IMPULSE AND IMPACT

Impulse – impact – Laws of impact – direct impact and oblique impact between two smooth spheres – loss of kinetic energy – motion of two interacting bodies – reduced mass.

RIGID BODY DYNAMICS

Compound pendulum – theory – equivalent simple pendulum – reversibility of centers of oscillation and suspension – determination of g and k – center of mass – velocity and acceleration of centre of mass – determination of motion of individual particle – system of variable mass.

UNIT 2 : CENTRE OF GRAVITY AND CENTRE OF PRESSURE

Centre of gravity of solid and hollow tetrahedron, solid and hollow hemisphere – Centre of pressure – vertical rectangular lamina – vertical triangular lamina.

HYDRODYNAMICS

Equation of continuity of flow – Venturimeter – Euler's equation of unidirectional flow – Torricelli's theorem – Bernoulli's theorem and its applications.

UNIT 3 : ELASTICITY

Stress – Strain – Hook's law- Elastic constants – Expressions for Poisson's ratio interms of elastic constants – workdone 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 4 : BENDING OF BEAMS

Expression for bending moment - Cantilever – expression for depression – cantilever oscillations – Expression for time period – Experiment to find Young's modulus – Non uniform bending – Experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope.

UNIT 5 : FLUID DYNAMICS

Surface tension-Definition – Excess of pressure over curved surface – Application to spherical and cylindrical drops and bubbles – variation of surface tension with temperature – Jaegar's method

Viscosity-Definition – Coefficient of viscosity – Rate of flow of liquid in a capillary tube – Poiseuille's formula – variation of viscosity of a liquid with temperature – Application

BOOKS FOR STUDY

1. Mechanics – Part I and II by Narayanamoorthy, National Publishing Company.

2. Mechanics by D.S.Mathur, S.Chand & Co., 2nd Edition (2001).

3. Mechanics by P. Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam, S.Chand & Co., New Delhi (1988).

4. Properties of Matter by Brij Lal and N.Subramaniam, S. Chand & Co., New Delhi (1994).

5. Properties of Matter by R.Murugeshan, S. Chand & Co., New Delhi (2001).

BOOKS FOR REFERENCE

1. General Properties of Matter by C.J. Smith, Orient Longman Publishers (1960).

2. Fundamentals of Physics by D. Halliday, R.Rensick and J. Walker, 6th edition, Wiley, NY (2001).

3. Mechanics and General Properties of Matter by P.K. Chakrabarthy, Books and Allied (P) Ltd. (2001).

4. Fundamentals of General Properties of Matter by H.R.Gulati, S. Chand & Co., New

NON-MAJOR: NON-CONVENTIONAL ENERGY SOURCES

UNIT 1: SOLAR ENERGY

Conventional Energy sources – Renewable Energy sources- solar energy – solarradiation and its measurements- solar energy collectors- parabolic collector- storage of solar energy

UNIT 2: APPLICATIONS OF SOLAR ENERGY

Solar water heater- solar driers- solar cells- solar electric power generation- solardistillation- solar pumping – solar cooking

UNIT 3: WIND ENERGY

Basic principles of wind energy conversion- power in the wind – forces in the Bladeswind energy conversion- Advantages and disadvantages of wind energy conversion systems (WECS) Energy storage- Applications of wind energy

UNIT 4: OCEANIC ENERGY

Energy from the oceans- Energy utilization- Energy from tides- Basic principle of tidal power – Utilization of tidal energy

UNIT 5: ENERGY FROM OTHER SOURCES

Chemical energy – Nuclear energy - Energy storage and distribution

BOOKS FOR STUDY:

1. Non-conventional sources of energy by G.D. Rai, 4th edition, Khanna Publishers, New Delhi (1996).

2. Solar Energy, Principles of thermal collection and storage by S.P.Sukhatme 2nd edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi (1997).

BOOK FOR REFERENCE:

1. Energy Technology by S.Rao and Dr. Parulekar

SEMESTER 2

Core Paper 2
THERMAL PHYSICS AND ACOUSTICS

UNIT 1 : THERMOMETRY AND CALORIMETRY

Platinum resistance thermometer – Calendar and Griffith's bridge – Thermistor – Specific heat capacity – Specific heat capacity of solids – Dulong and Petit's law – Specific heat capacity of liquid – method of mixtures – Barton's correction – Specific heat capacity of gases – C_p and C_v by Regnault's and Callendar & Barne's methods – variation of specific heat capacity of diatomic gases

LOW TEMPERATURE PHYSICS :

Joule-Kelvin effect – porous plug experiment – liquefaction of gases – Linde's method of liquefying air

UNIT 2 : THERMODYNAMICS

Thermodynamic equilibrium – zeroth law of thermodynamics – first law of thermodynamics – Reversible and irreversible processes – second law of thermodynamics-Heat engine – Carnot's engine – Carnot's theorem – Internal combustion engines – petrol and diesel engines – thermodynamics scale of temperature- Entropy – entropy and available energy – temperature – entropy diagram for Carnot's cycle - III Law of thermodynamics – Nernst's heat theorem.

UNIT 3 : CONDUCTION AND RADIATION

Thermal conductivity – rectilinear flow of heat – thermal conductivity of a good conductor – Forbe's method – thermal conductivity of a bad conductor – Lee's disc method – radiation – blackbody radiation – Wien's law – Stefan's law – Newton's law of cooling from Stefan's law – Solar constant – Pyrometer – Pyroheliometer.

UNIT 4 : WAVES AND OSCILLATIONS

Simple harmonic motion - combination of two SHMs in a straight line – at right angles – Lissajous's figures – free, damped, forced oscillations and resonance – intensity and loudness of sound – intensity level – decibel – noise pollution.

UNIT 5 : ULTRASONICS

Ultrasonics – production – piezo electric crystal method – magnetostriction method – applications
Acoustics of buildings – reverberation – Absorption coefficient – Sabine's formula – Acoustics aspects of halls and auditoriums.

BOOKS FOR STUDY

1. Heat and Thermodynamics by D.S.Mathur, 3rd edition Sulthan Chand & Sons, New Delhi (1978).

2. Heat and Thermodynamics by Brijlal and N. Subramanyam, S.Chand & Co, New Delhi (2000).

3. Heat by Narayanamoorthy and KrishnaRao, Triveni Publishers, Madras (1969).

4. Text book of Sound by V.R.Khanna and R.S.Bedi, 1st edition, Kedharnaath Publish & Co, Meerut (1998).

5. Waves and Oscillations by Brijlal and N. Subramanyam, Vikas Publishing house, New Delhi (2001).

6. Text book of Sound by Ghosh, S.Chand & Co, New Delhi (1996).

BOOKS FOR REFERENCE

1. Heat and Thermodynamics by Zemansky, McGraw – Hill Book Co. Inc., New York.

2. Fundamentals of Physics by Resnick Halliday and Walker, 6th edition, , John Willey and Sons, Asia Pvt.Ltd., Singapore.

3. Fundamentals of Thermodynamics by Carroll M.Leonard, Prentice-Hall of India (P) Ltd., New Delhi (1965).

4. Heat and Thermodynamics by J.B.Rajam and C.L.Arora, 8th edition, S.Chand & Co. Ltd., New Delhi (1976).

5. Principles of Thermodynamics by Jin Sheng Hsieh, 1st edition, McGraw – Hill Kogakusha Ltd., Tokyo (1975).

6. Thermodynamics by Warren Giedt, 1st edition, Van Nostrand Reinhold Company, NewYork (1971).

SEMESTER 2

NON-MAJOR ELECTIVE – ASTROPHYSICS

UNIT 1: ASTRONOMICAL INSTRUMENTS

Optical telescopes-refracting telescope-reflecting telescope- types of reflecting telescopes – detectors and image processing.

UNIT 2: SOLAR SYSTEM

The Sun- physical and orbital data-photosphere-chromosphere-corona-solar prominences – sunspot - solar flare- mass of the sun- solar constant- temperature of the sun- sources of solar energy-solar wind.

UNIT 3: MEMBERS OF THE SOLAR SYSTEM

Mercury – Venus- Earth – Mars – Jupiter- Saturn- Uranus- Neptune- Pluto- Moon – Bode's law – asteroids- comets – meteors.

UNIT 4: STELLAR EVOLUTION

Birth and death of a star –brightness of a star – stellar distance- Chandrasekar limit- white dwarfs- Neutron stars – black holes- Supernovae.

UNIT 5: THEORIES OF THE UNIVERSE AND GALAXIES

Origin of the Universe - the big bang theory- the steady state theory- the oscillating universe theory – Huble's law. Galaxies – types of galaxies- Milky way

Books for study :

1. Astrophysics - a modern perspective by K.S.Krishnaswamy, New Age International (P) Ltd, New Delhi (2002).
2. An introduction to Astro physics by Baidyanath Basu, second printing, Prentice – Hall of India (P) Ltd, New Delhi (2001).

Books for reference:

1. Modern Physics by R.Murugeshan, 11th edition, S.Chand & Company Ltd, New

   Delhi (2003).

2. Astronomy by S.Kumaravelu, Janki Calendar Corporation, Sivakasi (1993).

3. Astronomy by Baker and Fredrick, 9th edition, Van Nostrand reinhold Co, New York (1964).
4. Illustrated World of Science Encyclopedia –Vol I to VIII, Creative World Publications, Chicago.
5. Modern Physics by Kenneth S.Krane, John Wiley & Sons Inc., NY (1983).

SEMESTER- III
CORE PAPER 4

<center>**OPTICS**</center>

UNIT 1 : GEOMETRICAL OPTICS

Spherical aberration in lenses - methods of minimizing spherical aberration - condition for minimum spherical aberration in the case of two lenses separated by a distance - Chromatic aberration in lenses - Condition for achromatism of two thin lenses (in and out of contact) - Dispersion produced by a thin prism - Achromatic prisms - Combination of prisms to produce - Dispersion without deviation - Deviation without dispersion.

UNIT 2 : INTERFERENCE

Analytical treatment of interference - expression for intensity - condition for maxima and minima in terms of phase and path difference - Airwedge - determination of diameter of thin wire - test for optical flatness - Haidinger's fringes - Michelson's interferometer - theory - applications - determination of wavelength; thickness of thin transparent material and resolution of interferometer.

UNIT 3 : DIFFRACTION

Fresnel diffraction - diffraction at a circular aperture and narrow wire. Fraunhoffer diffraction - single slit - double slit - (simple theory). Plane diffraction grating - missing order - overlapping spectra - maximum number of orders - Determination of wavelengths using grating - normal incidence - oblique incidence (theory). Dispersive power of a grating. Rayleigh's criterion for resolution - limit of resolution of the eye - resolving power of Telescope and microscope - resolving power of prism and grating - Difference between resolving power and Dispersive power.

UNIT 4 : POLARISATION

Double refraction - Nicol prims -polarizer and analyzer - Huygen's explanation of double refraction in uniaxial crystals - Dichroism - polaroids and their uses - Double image polarizing prisms - Quarter wave plate and Halfwave plate - plane, elliptically and circularly polarized light - production and detection - Babinet's Compensator - optical Activity - Fresnel's explanation of optical activity - specific rotatory power - determination using Laurent's half shade polarimeter.

UNIT 5 : SPECTROSCOPY

Introduction to spectroscopy - Electromagnetic spectrum - characterization of electro magnetic radiation - quantization of energy - regions of the spectrum – classification of molecules – microwave spectroscopy – rigid rotator - vibrational spectroscopy – harmonic oscillator - Raman effect - experimental set up - Characteristics of Raman lines - Laser - Ruby laser - He-Ne, CO_2 laser construction and working - application of laser.

BOOKS FOR STUDY :

1.   A Text book of Optics by Subrahmanyam N., Brij Lal and M.N. Avadhanulu, S.Chand &   Co., New Delhi(2006).
2.   Optics by Khanna D.R. & Gulati H.R., S.Chand & Co., New Delhi (1979).
3.   Optics and Spectroscopy by R.Murugeshan and Kiruthiga Sivaprasath, S. Chand & Co., New Delhi (2006).
4.   Molecular structure and spectroscopy by Aruldhas, Prentice Hall of India Pvt. Ltd., New Delhi (2005).

BOOKS FOR REFERENCE :

1.   Fundamentals of Physics, by D.Halliday, R. Resnick and J. Walker, Wiley, 6th Edition, New York (2001).
2.   Optics by Ajay Ghatak, Tata McGraw-Hill publishing Co. Ltd., New Delhi(1998).
3.   Spectroscopy by Gurdeep Chatwal, Sham Anand, Himalaya Publishing House(1990).

CORE PAPER 5   ATOMIC PHYSICS
UNIT 1 : DISCHARGE PHENOMENON THROUGH GASES:

Moving of a charge in transverse electric and magnetic fields - specific charge of an electron - Dunnington's method - positive rays – Aston's , Dempster's mass spectrographs.

UNIT 2 : PHOTO-ELECTRIC EFFECT:

Richardson and Compton experiment - Laws of photoelectric emission - Einstein photoelectric equation - Millikan's experiment - verification of photoelectric equation - photo electriccells - photo emissive cells - photovoltaic cell - photo conducting cell - photomultiplier.

UNIT 3 : ATOMIC STRUCTURE :

Bohr and Sommerfield atom models - Vector atom model - Pauli's exclusion principle -explanation of periodic table - various quantum numbers - angular momentum and magnetic moment - coupling schemes - LS and JJ coupling - special quantisation - Bohr magnetron – Stern and Gerlach experiments.

UNIT 4 : IONISATION POTENTIAL AND SPLITTING OF ENERGY LEVELS:

Excitation and ionization potential – Frank and Hertz's experiment - Davis and Goucher's method. Spectral terms and notions - selection rules - intensity rule and interval rule - fine structure of sodium D lines - alkali spectra - fine structure of alkali spectra - spectrum of Helium - Zeeman effect - Larmor's theorem - Debye's explanation of normal Zeeman effect. Anamalous Zeeman effect - theoretical explanation. Lande's `g' factor and explanation of splitting of D1 and D2 lines of sodium. Paschen-Back effect - Stark effect (qualitative study only).

UNIT 5 : X-RAYS:

Bragg's law - X-ray spectroscopy - characteristic X-ray spectra - satellite and Auger effect - continuous X-ray spectra - X-ray absorption and fluorescence - Moseley's law - uses of X-rays - Compton effect - experimental verification of Compton effect.

BOOKS FOR STUDY:

1. Modern Physics by R. Murugeshan, Kiruthiga Sivaprasath, S. Chand & Co., New Delhi (2008).
2. Modern Physics by D.L.Sehgal, K.L.Chopra and N.K.Sehgal. Sultan Chand & Sons 3 Publication, 7th Edition, New Delhi(1991).
3. Atomic Physics by J.B. Rajam, S. Chand & Co., 20th Edition, New Delhi (2004).
4. Atomic and Nuclear Physics by N. Subrahmanyam and Brij Lal, S. Chand & Co. 5th Edition, New Delhi (2000).

BOOKS FOR REFERENCE:

1. Modern Physics by J.H. Hamilton and Yang, McGraw-Hill Publication, (1996).
2. Concepts of Modern Physics by A. Beiser, Tata McGraw-Hill, New Delhi(1997).
3. Fundamentals of Physics by D.Halliday, R.Resnick and J. Walker, Wiley, 6th Edition, New York(2001).
4. Modern Physics by Kenneth S.Krane, John Willey & sons, Canada(1998).

SEMESTER - V

CORE PAPER 7 -   ELECTRICITY AND ELECTROMAGNETISM

UNIT 1 : CHEMICAL EFFECTS OF ELECTRIC CURRENT

Faraday's laws of Electrolysis - ionic velocities and mobilities. Calculation and experimental determination of ionic mobilities - transport number. Thermoelectricity- Peltier effect - Experimental determination of Peltier coefficient - Thomson coefficient - experimental determination of Thomson coefficient - application of thermodynamics to a thermocouple and connected relations - thermoelectric diagram and uses.

UNIT 2 : DC CIRCUITS

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

UNIT 3 : AC CIRCUITS

AC Voltage and current - Power factor and current values in and AC circuit containing LCR circuit - series and Parallel resonant circuits - AC motors - single phase, three phase - star and delta connections - electric fuses - circuit brakers.

UNIT 4 : MAGNETIC EFFECT OF ELECTRIC CURRENT

Biot and Savart's law - magnetic field intensity due to a solenoid carrying current - effect of iron core in a solenoid - Helmholtz galvanometer - moving coil ballistic galvanometer - theory - damping correction - determination of the absolute capacity of a condenser using B.G.

UNIT 5: ELECTROMAGNETIC INDUCTION AND ITS APPLICATIONS

Faraday's laws of electromagnetic induction - inductor and inductance - determination of self inductance of a coil using Anderson method - mutual inductance - experimental determination of absolute mutual inductance - coefficient of coupling - Earth inductor - uses of earth inductor - measurement of horizontal component of the earth's magnetic field - measurement of vertical component of earth's magnetic field - calibration of B.G. - Induction coil and its uses.

BOOKS FOR STUDY :

1.   Electricity & Magnetism by M.Narayanamurthy & N.Nagarathnam, NPC pub., Revised edition.

2.	Electricity and Magnetism by Brijlal and Subrahmanyam; S.Chand & Co., New Delhi, (2000).

3.	Electricity & Magnetism by D.Chattopadhyay and P.C. Rakshit, Books and Allied (P) Ltd.(2001).

4.	Fundamentals of electricity and magnetism by B.D. Dugal and C.L. Chhabra, Shobanlal Nagin, S. Chand & Co., 5th edition, New Delhi(2005).

5.	Electricity and Magnetism by R. Murugeshan, S.Chand & Co., New Delhi, (2008).

BOOKS FOR REFERENCE:

1.	Electricity & Magnetism by K.K.Tewari, S.Chand & Co., New Delhi, .(2002).

2.	Introduction to Electrodynamics by D.J.Griffiths, Printice Hall of India Pvt. Ltd., 3rd Edition, New Delhi(2003).

3.	Fundamentals of Physics, D.Halliday, R.Resnick and J.walker, Wiley, 6th Edition, New York (2001).

CORE PAPER 8- NUCLEAR PHYSICS AND PARTICLE PHYSICS

UNIT 1 : GENERAL PROPERTIES OF NUCLEI

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

UNIT 2 : RADIOACTIVITY

Natural radioactivity-law of disintegration-half life and mean life period-units of radioactivity-transient and secular equilibrium-radiocarbon dating-age of earth - alpha rays-characteristics-Geiger Nuttal law - α-ray spectra-Gamow's theory of α-decay (qualitative study)-beta rays-characteristics-beta ray spectra-neutrino hypothesis-violation of parity conservation-experimental verification with Co^{60}-gamma rays and internal conversion-nuclear isomerism.

UNIT 3 : RADIATION DETECTORS AND PARTICLE ACCELERATORS

Ionisation chamber-G.M.Counter-quenching and resolving time-scintillation counter-photo multiplier tube – thermoluminescence -thermoluminescence dosimetry (TLD) - Linear accelerator-cyclotron-synchrocyclotron, betatron.

UNIT 4 : NUCLEAR REACTIONS

Conservation laws-nuclear reaction Kinematics-Q-value-threshold energy - artificial radioactivity-radioisotopes and its uses-classification of neutrons-nuclear fission-chain reaction - critical mass and size-nuclear reactor-breeder reactor - transuranic elements-nuclear fusion-thermonuclear reactions-sources of stellar energy.

UNIT 5 : ELEMENTARY PARTICLES

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

BOOKS FOR STUDY

1.   Atomic and Nuclear Physics by N. Subrahmanyam and Brijlal, S Chand & Co.,
                                                New Delhi(1996).
2.   Nuclear Physics by Tayal D.C., Himalaya Publishing House, Mumbai(2006).

3.   Nuclear Physics by R.C.Sharma, K.Nath & Co., Meerut (2000)

4.   Nuclear Physics by Irving Kaplan, Narosa Publishing house, New Delhi.

BOOKS FOR REFERENCE

1.   Nuclear Physics by R.R.Roy and B.P.Nigam, New Age International (P) Ltd., New Delhi(1997).

2.   Fundamentals of Elementary Particle Physics by Longo, Mc Graw-Hill.

3.   Nuclei and Particles by Serge., W.A. Benjamin, USA

4.   Elements of Nuclear Physics by ML Pandya and RPS Yadav, Kedarnath Ram Nath, Meerut

CORE PAPER 9 - SOLID STATE PHYSICS

UNIT 1 : CRYSTAL STRUCTURE

Crystal lattice – primitive and unit cell – seven classes of crystal – Bravais Lattice – Miller Indices – Structure of crystals – simple cubic, hexagonal close packed structure, face centred cubic structure, body centred cubic structure – Sodium chloride structure, Zinc Blende structure, Diamond structure.

UNIT 2 : DEFECTS IN SOLIDS

X ray diffraction – Bragg's law in one dimension – Experimental methods – Laue Method, powder crystal method and rotating crystal method.

Defects in solids - Point defects - Frenkel and schottky defects - Equilibrium concentrations - Line defects - Edge dislocation and screw dislocation - Surface defects - Grain boundary - Effects of Crystal imperfections.

UNIT 3: CHEMICAL BONDS AND CRYSTALLOGRAPHY

Interatomic forces - Different types of chemical bonds - Ionic bond - Cohesive energy of ionic Crystals and Madelung constant - Covalent bond - Metallic bond - Van der Waal's bond - Hydrogen bond.

Superconductivity - General properties - Type I and II Superconductors - Meissner effect - BCS theory - applications of super conductors.

UNIT 4 : DIELECTRIC PROPERTIES

Dielectric materials - Polarization, susceptibility and dielectric constant - Local field or internal field - Clausius - Mossoti relation - Sources of polarizability - Electronic polarizability - Ionic polarizability - Orientational polarizability - Frequency and temperature effects on polarization - Dielectric breakdown – Properties of different types of insulating materials.

UNIT 5 : MAGNETIC PROPERTIES

Different types of magnetic materials - classical theory of diamagnetism (Langevin theory) - Langevin theory of paramagnetism - Weiss theory of paramagnetism - Heisenberg interpretation on internal field and quantum theory of ferromagnetism - Antiferromagnetism - Hard and soft magnetic materials.

BOOKS FOR STUDY

1.   Materials Science by M.Arumugam, Anuradha Agencies Publishers.(2002)

2.   Solid State Physics by R L Singhal, Kedarnath Ram Nath & Co., Meerut (2003)

3.   Introduction to Solid State Physics by Kittel, Willey Eastern Ltd(2003).

4.   Materials Science and Engineering by V. Raghavan, Prentice Hall of India Private Limited, New Delhi(2004).

BOOKS FOR REFERENCE

1.   Solid State Physics by S.O.Pillai, New Age International (P) Ltd.,(2002).

2.   Solid State Physics by A. J.Dekker, Macmillan India(1985).

3.   Solid State Physics by HC Gupta, Vikas Publishing House Pvt. Ltd., New Delhi (2001).

CORE PAPER 10 BASIC ELECTRONICS

UNIT 1 : SEMICONDUCTOR

Band gap - forbidden energy gap - valence and conduction bands, pure semiconductor - Law of mass action, Impurity in semiconductors - energy band diagram and fermi level - PN junction barrier voltage across the junction.

UNIT 2 : TRANSISTOR AMPLIFIER

Transistor – different modes of operations – CB mode & CE mode - Two port representation of a transistor - h parameter - AC equivalent circuit using h parameters - analysis of an amplifier using h parameters common emitter only - expression for current gain, voltage gain, input impedance, output impedance and power gain - RC coupled amplifier - frequency response - analysis of low, mid and high frequency regions - classification of amplifiers - class A power amplifier – push pull, class B power amplifier - emitter follower.

UNIT 3 : FEEDBACK OSCILLATORS

Feedback in amplifiers - effect of negative feedback - concept of feedback – Barkhuesen condition - oscillators - phase shift and Wien's bridge oscillators - expression for frequency of oscillation and condition for oscillation in each case.

UNIT 4 : WAVE SHAPING CIRCUITS AND MULTIVIBRATORS

Clipping and clamping circuits - biased clipper - integrating and differentiating circuits - RC time constant - Multivibrators - astable, monostable and bistable multivibrator - using transistors.

UNIT 5 : SPECIAL SEMICONDUCTOR DEVICES AND APPLICATIONS

Field effect transistor (FET) - characteristics - FET amplifier - Unijunction transistor (UJT) - characteristics - saw tooth generator - VVR action - relaxation oscillator - frequency of oscillation - SCR characteristics - SCR as a switch - SCR rectifier.

BOOKS FOR STUDY

1.   Hand Book of Electronics by Gupta and Kumar - Pragati Prakashan – Meerut(2002).

2.   Principles of Electronics by V.K. Mehta, Rohit Mehta S. Chand & Co.(2006).

3.   Electronics by M. Arul Thalapathi, Comptek Publishers(2005).

4.   Elements of Electronics by M.K.Bagde and Singh S.P., S. Chand & Co., New Delhi(1990).

5.   Applied Electronics by A. Subramanyam – National Publishing Co.(1997)

BOOKS FOR REFERENCE

1.   Electronic Devices by Mittal.G.K., G.K. Publishers Pvt. Ltd., (1993).

2.   Basic Electronics by B.L. Theraja, S. Chand & Co., (2008).

3.   Solid State Electronics by Ambrose and Vincent Devaraj, Meera Publication.

4.   Applied Electronics by R.S. Sedha, S. Chand & Co.(1990).

SEMESTER - VI

CORE PAPER 11 - RELATIVITY AND QUANTUM MECHANICS

UNIT 1 : RELATIVITY

Frames of reference - Galilean transformation - Michelson - Morley 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 relation - Elementary ideas of general relativity.

UNIT 2 : WAVE NATURE OF MATTER

Phase and group velocity - wave packet - expression of De Brogile's wave length - Davisson and Germer's experiment - G.P.Thompson's experiment - Electron microscope - Heisenberg's uncertainty principle and its consequences.

UNIT 3 : SCHRODINGER EQUATION

Inadequacy of classical mechanics - Basic postulates of quantum mechanics - Schrodinger equation - Properties of wave function - Probability interpretation of wave function - linear operators - self adjoint operators - expectation value - eigenvalues and eigenfunctions - commutativity and compatibility.

UNIT 4 : ANGULAR MOMENTUM IN QUANTUM MECHANICS

Orbital angular momentum operators and their commutation relations - separation of three dimensional Schrodinger equation into radial and angular parts - Elementary ideas of spin angular momentum of an electron - Pauli matrices.

UNIT 5 : SOLUTIONS OF SCHRODINGER EQUATION

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

BOOKS FOR STUDY

1.   A Text book of Quantum mechanics by P.M.Mathews and S.Venkatesan, Tata McGraw - Hill, New Delhi(2005).

2.   Quantum Mechanics by V.K.Thankappan, New Age International (P) Ltd. Publishers, New Delhi(2003).

3.   Quantum mechanics by K.K.Chopra and G.C. Agrawal, Krishna Prakasam Media (P) Ltd., Meerut First Edition(1998).

4.   Modern Physics by R. Murugeshan and Kiruthiga Sivaprasath, S. Chand & Co.,(2008).

BOOKS FOR REFERENCE

1. Mechanics and Relativity by Brijlal Subramanyam, S.Chand & Co., New Delhi, . (1990).
2. Concepts of modern physics by A.Beiser. Tata McGraw - Hill, 5th edition, NewDelhi(1997).
3. Introduction to quantum mechanics by Pauling and Wilson, McGraw – Hill.
4. Quantum mechanics by A.Ghatak and Loganathan, Macmillan India Pvt. Ltd.

CORE PAPER 12 - MATHEMATICAL METHODS IN PHYSICS

UNIT 1 : MATRICES AND SPECIAL FUNCTIONS

Characteristic equation of a matrix - Eigenvalues and Eigenvectors - Hermition and Unitary matrices - Properties of their eigenvalues and eigenvectors - Diagonalisation of matrices.

Special functions - Gamma and Beta functions - Series solutions of Legendre, Bessel and Hermite equations - Orthogonality properties of Legendre and Hermite Polynomials and Bessel functions.

UNIT 2 : ELEMENTARY COMPLEX ANALYSIS

Functions of a Complex variable - Continuity and differentiability - single and multivalued functions - Analytic function - Cauchy - Riemann conditions (necessity and sufficiency). Cauchy - Riemann Conditions in the Polar (r, θ) coordinates.

UNIT 3 : VECTOR ANALYSIS

Scalar and Vector fields - Gradient, Divergence and Curl - Equations of motion in the vector notation - equations of motion (components) in cartesian coordinates and spherical polar coordinates - equation of motion in the polar coordinates.

UNIT 4 : CLASSICAL MECHANICS

Generalised coordinates - configuration space - Lagrange's equation - simple applications : to find equations of motion given a lagrangian; central potential and conservation of angular momentum - Hamilton function and Hamilton's equations - harmonic oscillator.

UNIT 5 : STATISTICAL PHYSICS

Quantum statistics of identical particles - Maxwell - Boltzmann, Bose - Einstein and Fermi - Dirac statistics - Derivation of Planck's radiation formula from Bose - Einstein statistics - Degenerate Fermi gas.

BOOKS FOR STUDY

1.   Mathematical Physics by Sathya Prakash, Sultan Chand and Sons, New Delhi (1996)

2.   Classical Mechanics by J.C. Upadhyaya, Himalaya Publishing House, Mumbai(2003).

3.   Introduction to Statistical Mechanics by S.K. Sinha Narosa Publication(2007).

4.   Heat Thermodynamics and Statistical Physics by Brijlal N.Subrahmanyam, P.S. Hemne S.Chand & Co., New Delhi.(2007).

BOOKS FOR REFERENCE

1.   Mathematical Physics by B.D. Gupta, Vikas Publishing House Pvt. Ltd., New Delhi(1996).

2.   Advanced Engineering Mathematics by E.Kreyszig, Eighth Edition, Wiley Publishers, New York(1989).

3.   Classical Mechanics by H.Goldstein, Special Indian student edition, Narosa Publishing House, New Delhi(1985)

SEMESTER – V   ELECTIVE 1

NUMERICAL METHODS

UNIT 1 : SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS

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

UNIT 2 : NUMERICAL SOLUTION OF ALGEBRAIC, TRANSCENDENTAL AND DIFFERENTIAL EQUATION

Bisection method – Regula falsi method - Newton - Raphson method - - Horner's method - Solution of ordinary differential equation - Euler's method.

UNIT 3 : INTERPOLATION

Finite differences – operators $\Delta, \nabla, \delta, E, D$ – relation between operators –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 and 3/8 rule - Applications - Weddle's rule

BOOKS FOR STUDY

1.   Numerical methods - M.K.Venkatraman, National Publishing Company, (1990).

2.   Numerical methods by V. Rajaraman, Prentice - Hall India Pvt. Ltd., (2003).

3.   Numerical methods by P. Kandasamy, K. Thilagavathy and K. Gunavathy, S. Chand & Co. (2002).

BOOKS FOR REFERENCES

1.   Numerical methods for Scientific and Engineering computation by Jain Iyenger and Jain, New Age International (P) Ltd.,(2004).

2.   Numerical methods by S.S.Sastry, Prentice Hall of India Pvt. Ltd., New Delhi(2003).

INTEGRATED ELECTRONICS

UNIT 1 : FUNDAMENTAL DIGITAL ELECTRONICS

Number systems – binary – hexadecimal – Binary addition – subtraction (1's and 2's compliment method) – multiplication - division - BCD – Conversion – 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 and averaging amplifier - solving simultaneous equations - comparator - square wave generator - Wien's bridge oscillator - Schmitt trigger

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)

ELECTIVE 3

MICROPROCESSOR FUNDAMENTALS

UNIT 1 : ARCHITECTURE

Architecture of 8085 – registers, flags, ALU, address and data bus, demultiplexing address/data bus – control and status signals – control bus, Programmer's model of 8085 – Pin out diagram – Functions of different pins.

UNIT 2 : PROGRAMMING TECHNIQUES

Instruction set of 8085 – data transfer, arithmetic, logic, branching and machine control group of instructions – addressing modes – register indirect, direct, immediate and implied addressing modes.

Assembly language & machine language – programming techniques: addition, subtraction, multiplication, division, ascending, descending order, largest and smallest (single byte)

UNIT 3 : INTERFACING MEMORY TO 8085

Memory interfacing – Interfacing 2kx8 ROM and RAM, Timing diagram of 8085 (MOV R_d, R_s – MVI R_d,data(8)) .

UNIT 4 : INTERFACING I/O PORTS TO 8085

Interfacing input port and output port to 8085 – Programmable peripheral interface 8255 – flashing LEDs.

UNIT 5 : INTERRUPTS

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

BOOKS OF STUDY

1. Microprocessor Architecture programming and application with 8085 / 8080A. by R.S.Gaonkar, Wiley Eastern Ltd.(1992).

2. Fundamental of microprocessor 8085 by V. Vijayendran, S.Viswanathan

    Publishers, Chennai(2003).

3. Fundamentals of Microprocessors and microcomputers by B.Ram - Dhanpat RAI publication.

BOOK FOR REFERENCE

1.   Introduction to microprocessor by Aditya Mathur - Tata Mc.Graw Hill Publishing Company Ltd.(1987).

2.   Microprocessor and digital system by Dougles V. Hall - 2nd Edition - McGraw Hill Company(1983).

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MAJOR PHYSICS PRACTICAL

CORE PRACTICAL – I

(AT THE END OF THE SECOND SEMESTER)

1. Young's modulus – Non-uniform bending – Pin & microscope

2. Young's modulus – Uniform bending – Optic lever

3. Rigidity modulus – Torsional pendulum (without identical masses)

4. Rigidity modulus and moment of inertia – Torsional pendulum (With identical masses)

5. Surface tension and interfacial surface tension – drop weight method

6. Coefficient of viscosity of liquid – Graduated burette (radius of capillary tube by Mercury pellet method)

7. Sonometer – Verification of laws and frequency of tuning fork

8. Sonometer – Relative Density of a solid and liquid

9. Specific heat capacity of a liquid – Newton's law of cooling

10. Specific heat capacity of liquid – Method of mixtures (Half-time correction)

11. Focal length, Power, R and refractive index of a long focus convex lens

12. Focal length, Power, R and refractive index of a concave lens

13. Spectrometer - refractive index of a liquid

14. P.O. Box – Temperature coefficient of resistance

15. Potentiometer – Internal resistance

16. Potentiometer - Calibration of low range voltmeter.

17. Carey Foster's bridge – Specific resistance of a given wire.

CORE PAPER – 6

PRACTICAL - II

(PRACTICAL EXAMINATION AT THE END OF FOURTH SEMESTER)

1.   Young's modulus - cantilever - depression - (Static method)-(Scale and telescope)

2.   Comparison of EMF's of the given cell using B.G

3.   Rigidity modulus - Static torsion

4.   Compound pendulum - g and k

5.   Sonometer - A.C. Frequency - Steel and Brass wires

6.   Melde's string - frequency, Relative Density of a solid and liquid

7.   Thermal conductivity of a bad conductor - Lee's disc method

8.   Spectrometer - μ of a glass prism - i-d Curve

9.   Comparison of capacitance of the given capacitor using B.G

10.   Spectrometer - Grating N and λ - minimum deviation method

11.   Air wedge - Thickness of a wire

12.   m and B_H - deflection mangetometer Tan C position and vibration magnetometer

13.   Carey Foster bridge - Temperature coefficient of resistance of a coil

14.   Potentiometer – Specific resistance of a given wire.

15.   Potentiometer - Ammeter calibration.

16.   Figure of merit of galvanometer (Miror Galvanometer Or Table Galvanometer)
17.   * C.R.O. Study of wave forms - Lissajou's figures - frequency determination

18.   * Study of resistors, Choke, capacitors and transformer

19.   * Construction of battery eliminator - various voltages - with filter circuit and IC voltage regulator.

20.   * Two transistor Radio receiver

      *   Not for Examination

CORE PAPER - 13

PRACTICAL - III

(PRACTICAL EXAMINATION AT THE END OF SIXTH SEMESTER)
(Any Fifteen Experiments)

1.   Young's modulus - Non uniform Bending - Koenig's method.

2.   Kundt's Tube – Determination of velocity of sound in solid - Young's modulus.

3.   Spectrometer - Small angled prism - Normal incidence and emergence refractive index of the material of prism.

4.   Spectrometer - (i - i') curve - refractive index.

5.   Spectrometer - Cauchy's constant.

6.   Newton's rings - R_1, R_2 and μ of convex lens.

7.   Spectrometer - Grating N and λ – normal incidence method

8.   Field along axis of a circular coil - Deflection magnetometer - B_H and M.

9.   Field along axis of a circular coil - vibration magnetic needle - B_H.

10.   Potentiometer - Calibration of high range voltmeter

11.   Potentiometer - Temp coeff. of resistance of a thermistor

12.   Potentiometer - Emf of a thermo couple.

13.   Thermo emf - Mirror galvanometer (or) spot galvanometer

14.   B.G - Figure of merit (quantity of charge)

15.   B.G - Internal resistance of a cell

16.   B.G - High Resistance by leakage

17.   B.G - Absolute capacitance

18.   B.G - Comparison of mutual inductances

19.   B.G - Absolute mutual inductance

20.   B.G - Self inductance - Anderson method.

CORE PAPER – 14

PRACTICAL - IV

(PRACTICAL EXAMINATION AT THE END OF SIXTH SEMESTER)

(Any Fifteen Experiments)

1. A.C. Circuit – LCR – Series resonance

2. A.C. Circuit – LCR – Parallel resonance

3. Bridge rectifier - Zener regulated power supply - 9V characteristics.

4. R-C Coupled Single Stage Amplifier - Frequency Response

5. R-C Coupled Amplifier with feedback.

6. Emitter follower

7. Transistor - Phase Shift Oscillator

8. Transistor - Wien's Bridge Oscillator

9. FET characteristics

10. FET amplifier

11. UJT characteristics

12. UJT Relaxation oscillator

13. SCR characteristics

14. Transistor - Astable multivibrator

15. Transistor - Bistable multivibrator

16. NAND / NOR as universal gates.

17. Half Adder – Full adder – Ex-OR(7486)

18. Half Subtractor – Full subtractor – Ex - OR(7486)

19. 4 bit ripple counter using 7473/7476

20. 4 bit shift register using 7473/7476

21. Decode counter using 7490

CORE PAPER – 15

PRACTICAL - V

(PRACTICAL EXAMINATION AT THE END OF SIXTH SEMESTER)

(Any Fifteen Experiments)

1. Microprocessor – 8085 – 8 bit Addition

2. Microprocessor – 8085 – 8 bit Subtraction

3. Microprocessor – 8085 – 8 bit Multiplication

4. Microprocessor – 8085 – 8 bit Division

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

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

    ascending order

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

    descending order

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

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

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

11. Op amp 741 - Summing and difference amplifier

12. Op amp 741 – Differentiator, integrator

13. OP amp 741 – Solving simultaneous equations

14. Op amp 741 – Wein's Bridge oscillator

15. Op amp 741 - Phase Shift oscillator

16. 555 - Timer - Schmitt Trigger

17. 555 - Timer - Astable operation

18. 555 - Timer - Monostable

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

BOOKS FOR THE STUDY & REFERENCE :

1. Practical Physics by D. Chattopadhyay, P.C. Rakshit, New Central Book Agency (p) Ltd. Kolkata(2007).

2. Practical Physics and Electronics by C.C.Ouseph, U.J.Rao and Vijayendran, S.Viswanathan (Printers & Publishers) Pvt., Ltd (2007).

3. Practical Physics by C L Arora, S. Chand & Co., New Delhi (2008)

ALLIED PAPER FOR MATHEMATICS

ALLIED PHYSICS PAPER – I

UNIT 1 : WAVES AND OSCILLATIONS

Simple harmonic motion – composition of two simple harmonic motion at right angles (periods in the ratio 1:1) – Lissajou's figures – uses – laws of transverse vibrations of strings – Melde's string – transverse and longitudinal modes – determination of a.c frequency using sonometer (steel and brass wires) – ultrasonics – production – application and uses – reverberation – factors for good acoustics of hall and auditorium.

UNIT 2 : PROPERTIES OF MATTER

Elasticity : Elastic constants – bending of beam – Young's modulus by non- uniform bending – energy stored in a stretched wire – torsion in a wire – determination of rigidity modulus by torsional pendulum – static torsion.

Viscosity : Coefficient of viscosity – Poissuelle's formula – comparison of viscosities - burette method – Stoke's law – terminal velocity – viscosity of highly viscous liquid – lubrication.

Surface tension : Molecular theory of surface tension – excess of pressure inside a drop and bubble – variation of surface tension with temperature – Jaeger's method.

UNIT 3 : THERMAL PHYSICS

Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory and application – liquefaction of gasses – Linde's process – Helium I and II – adiabatic demagnetization. Thermodynamic equilibrium – laws of thermodynamics – entropy change of entropy in reversible and irreversible processes.

UNIT 4 : ELECTRICITY AND MAGNETISM

Capacitor – energy of a charged capacitor - loss of energy due to sharing of charges – magnetic field due to a current carrying conductor – Biot Savart's Law – Field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an ac circuit – circuit control and protective devices – switch and its types – fuses circuit breaker and relays.

UNIT 5 : GEOMETRICAL OPTICS

Refraction – Refractive index by microscopy – air cell – refraction at grazing incidence and grazing emergence in prisms – combination of two small angled prisms to produce dispersion without deviation and deviation without dispersion – direct vision prism – constant deviation prism – defects of images – coma – distortion – spherical and chromatic aberration in lenses.

BOOKS FOR STUDY

1. Allied Physics by R. Murugesan, S.Chand & Co, New Delhi(2008).

2. Waves and Oscillations by Brijlal and N. Subramanyam, Vikas Publishing house,

   New Delhi(2001).

3. Properties of Matter by Brij Lal and N.Subramaniam, S. Chand & Co., New Delhi(1994).

4. Heat and Thermodynamics by J.B.Rajam and C.L.Arora, S.Chand & Co., 8th edition, New Delhi(1976).

5. Optics and Spectroscopy by R. Murugesan, S.Chand & Co, New Delhi

BOOKS FOR REFERENCE

1. Fundamentals of Physics by Resnick Halliday and Walker, John Willey and Sons, Asia Pvt.Ltd., 6th edition, Singapore.

2. Text book of Sound by V.R.Khanna and R.S.Bedi, Kedharnaath Publish & Co, 1st edition, Meerut (1998).

3. Electricity and Magnetism by N.S. Khare and S.S. Srivastava, Atma Ram & Sons, 10th Edition, New Delhi (1983).

4. Optics by D.R. Khanna and H.R. Gulati, S. Chand & Co., New Delhi (1979).

ALLIED PHYSICS – PAPER II
UNIT 1 : PHYSICAL OPTICS

Velocity of light – Michelson's method. Interference : Colours of thin films –air wedge – determination of diameter of a thin wire by air wedge – test for optical flatness – Diffraction – Fresnel's explanation of rectilinear propagation of light – theory of transmission grating – Normal incidence – polarization – double refraction - optical activity – polarimeter.

UNIT 2 : ATOMIC PHYSICS

Atom model – vector atom model – electron, spin, quantum numbers – Pauli's exclusion principle – electronic configuration of elements and periodic classification of elements – various quantum numbers – magnetic dipole moment of electron due to orbital and spin motion – Bohr magneton – spatial quantisation – Stern and Gerlach experiment.

UNIT 3 : NUCLEAR PHYSICS

Nuclear model – liquid drop model – magic numbers - shell model – nuclear energy – mass defect – binding energy. Radiation detectors – ionization chambers – GM Counter – Fission Controlled and Uncontrolled chain reaction – nuclear reactor – thermonuclear reactions – stellar energy.

UNIT 4 : ELEMENTS OF RELATIVITY AND QUANTUM MECHANICS

Postulates of theory of relativity – Lorentz transformation equations – derivation – length contraction – time dilation – mass energy equivalence – uncertainty principle – postulates of wave mechanics – Schrodinger's equation – application to a particle in a box.

UNIT 5 : ELECTRONICS
Basic Electronics: Zener diode – voltage regulator – LED – Transistor RC coupled amplifier – feedback principle – condition for oscillation – phase shift oscillator – Wein's bridge oscillator.

Digital Electronics : NAND and NOR gates – Universal building blocks – Boolean algebra – Demorgan's theorem – verification – elementary ideas of ICs – SSI , MSI, LSI and VLSI – Half adder, Full adder, Half Subtractor and Full subtractor.

BOOKS FOR STUDY

1.   Allied Physics by R. Murugesan, S.Chand & Co, New Delhi(2008).

2.   Allied Physics by K. Thangaraj and D. Jayaraman, Popular Book Depot, Chennai(2004).

3.   Text book of Optics by Brijlal and N. Subramanyam, S.Chand & Co, New Delhi(2002).

4.   Modern Physics by R. Murugesan, S.Chand & Co, New Delhi (2005).

5.   Applied Electronics by A. Subramaniyam, National Publishing Co., 2nd Edition, Chennai(2001).

BOOKS FOR REFERENCE

1.   Fundamentals of Physics by Resnick Halliday and Walker, John Willey and Sons, Asia Pvt.Ltd., 6th Edition, Singapore.

2.   Optics by D.R. Khanna and H.R. Gulati, S. Chand & Co., New

        Delhi (1979).

3.   Concepts of Modern Physics by A.Beiser, Tata McGraw Hill Publication, New Delhi(1997).

4.   Digital Fundamentals by Thomas L.Floyd, Universal Book Stall – New Delhi (1998).

ALLIED PHYSICS PRACTICAL

ALLLIED PHYSICS – PRACTICALS
(PRACTICAL EXAMINATION AT THE END OF EVEN SEMESTER)

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 without mass

5. Surface tension and interfacial tension – Drop Weight method

6. Comparison of viscosities of two liquids – Burette method

7. Specific heat Capacity of a liquid – Half time correction

8. Sonometer – Determination of a.c frequency

9. Newton's rings - Radius of curvature

10. Air wedge – Thickness of a wire

11. Spectrometer – Grating – Wavelength of Mercury lines – minimum deviation method.

12. Potentiometer – Voltmeter Calibration

13. P.O. Box – Specific resistance

14. B.G. – Figure of merit

15. Construction of AND, OR, NOT gates – using diodes and Transistor

16. Zener Diode – Characteristics

17. NAND gate as a universal gate

Note : Use of Digital Balance Permitted

BOOKS FOR STUDY AND REFERENCE:

1.   Practical Physics by M.N.Srinivasan S. Chand & Co.,

2.   Practical Physics by M.Arul Thalapathy Comptek Publishers.

APPLIED PAPER FOR M.Sc., (Computer Science & Technology)

APPLIED PHYSICS – I

UNIT 1:- SEMICONDUCTOR DIODE

Introduction - on junction - current voltage characteristic of a semiconductor diode - Zener diode as a voltage Regulator - Tunnel diode - Schottley diode - optoelectronic devices - light emitting diode - photo diodes.

UNIT 2:- THE BASIC TRANSISTORS

The bipolar junction transistor - transistor biasing - transistor circuit configurations - common base (CB) Common emitter (CE) Common collector (CC) configurations - CB,CE,CC static characteristics - construction of OR, AND and NOR gates using transistors - logic gate parameters - logic families - resistor transistor logic (RTL) - diode transistor logic (DTL) -transistor transistor logic (TTL) - fabrication of ICS.

UNIT 3:- ELECTRONIC INSTRUMENTS

Introduction - multimeter - multimeter as voltmeter - multimeter as ammeter - multimeter as ohm meter - applications of multimeter - sensitivity of multimeter - merits and demerits of multimeter - cathode ray oscilloscope.

UNIT 4:- LASERS

Atomic structure - Bohr's atomic model - energy levels - energy bands in solids - basic principle of laser operation - population inversion - construction and working of He-Ne laser - CO_2 laser - Ruby laser - semiconductor laser – applications.

UNIT 5:- FIBER OPTIC COMMUNICATION SYSTEMS

Introduction to communication - types of optical fibers - single and bundled fibers - fibers materials – attenuation - dispersion fiber optic light sources – detectors - fiber optic communications.

BOOKS FOR STUDY & REFERENCE:-

1. Elements of Electronics, M.K.Badge and S.P.Singh, S.Chand & Co, 1987

2. Basic Electronics Solid state, B.C.Theraja, S.Chand & Co, 1995

3. Principles of Electronics-V.K.Metha, S.Chand & Co, 1997.

APPLIED PHYSICS - II

Unit 1:- ELECTRICAL PROPERTIES

Free electron of Drude and Lorentz - Weidman Franz Law - Distinction between Conductor, Semiconductors, Insulators on the basis of band theory - Factors affecting resistivity of a conductor: Temperature, Allowing, Pressure, Strain, Magnetic field and environment.

Unit 2:- MAGENETIC MATERIALS

Magnetic material - classification of magnetic materials, ferromagnetism: Domain theory - Hysteresis - Hard and Soft magnetic materials - Curie - Weiss law - Magnetostriction, Ferrites: Preparation, Properties, Applications - Magnetic bubble memory, Magnetic recording - Writing magnetic data – Reading magnetic data - Storage of magnetic data.

Unit 3:- DIELECTRIC MATERIALS

Qualitative study of three types of polarization - effect of temperature and frequency on dielectric constant - dielectric loss - Ferro electric materials - Behaviour of barium titanate - Pieze - electric materials - Breakdown mechanism - Classification of insulating materials on temperature basis.

Unit 4:- SUPER CONDUCTORS

Qualitative study of the Phenomenon - Critical temperature and critical field. Meissner effect - Type I and II superconductors. BCS theory of superconductivity (Qualitative) - High temperature superconductor. Applications: Crypton, magnetic levitation - Superconducting magnets.

Unit 5:- MODERN ENGINEERING MATERIALS

Metallic glasses as transformer core material - Nanophase materials - Synthesis - Variation of physical properties with Geometry - Shape memory alloys - Characteristics of SMA - Thermomechanical behavior - commercial SMA - Applications - Biomaterial.

BOOKS FOR STUDY REFERENCE:-

1. R. Raghavan V; "Material Science and Engg A first Course"; PHI; 1991.
2. Arumugam M; "Material Science"; Anuradha Pub. 1994.
3. P.K. Palanisamy ; "Material Science"; Scitech; 2002.
4. Setha & Gupta; "Course in electrical Engg materials"; Dhanpat Raj & Sons 1990.