

APPENDIX – 32 (R&S)
UNIVERSITY OF MADRAS

SRI SANKARA ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)

B.Sc., PHYSICS
(effective from the academic year 2018 – 2019)

REGULATIONS
Choice based credit system

1. ELIGIBILITY FOR ADMISSION

Candidates for admission to the first year of the Degree of Bachelor of Science courses in Physics shall be required to have passed the Higher Secondary Examinations (Academic) 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

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.

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

<p>PART – IV</p> <p>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).</p> <p>(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.</p> <p>(c) Others who do not come under a + b can choose non-major elective comprising of two courses.</p>						
<p>2*Skill based subjects(Elective) – (Soft Skill)</p>						

The following procedure to be followed for Internal Marks

Theory Papers Internal Marks 25

INTERNAL MARKS

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

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 marks

i) Attendance	5 marks
ii) Practical Test best 2 out of 3	30 marks
iii) Record	5 marks

Project	Maximum – 100 marks
i) Internal Marks	(best 2 out of 3 presentations) 20 marks
ii) Viva	20 marks
iii) Project Report	60marks

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.
- iv. 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 141 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 (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 – 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 2018 – 2019 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 2020 Examinations. Thereafter, they will be 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) PHYSICS MATHEMATICS / PHYSICS

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.

(ii) Classical - Sanskrit

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. PHYSICS

(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

FIRST SEMETER

S.NO	Name of the Subject	Ins. Hours	Credit	Exam hours	External Mark	Internal mark	Total
1.	Part 1 – Tamil - I /Sanskrit - I	4	3	3	75	25	100
2.	Part 11 – English – I	4	3	3	75	25	100
3.	Part III - Mechanics and Properties of Matter	6	4	3	75	25	100
4.	Part III - Physics Practical –I	3**	2	3			
5.	Part III - Mathematics – I (Allied)	9	5	3	75	25	100
6.	Part IV - Basic Tamil I (or) Part IV - Non-Major Elective	2	2	3	75	25	100
7.	Part IV Soft Skill – Essentials of language and communication level-I	2	3	3	75	25	100
		30	22		450	150	600

**** Practical examination at the end of the even semester.**

SECOND SEMESTER

S.NO	Name of the subject	Ins. Hours	Credit	Exam hours	External Mark	Internal mark	Total
1.	Part 1 – Tamil - II /Sanskrit – II	4	3	3	75	25	100
2.	Part 11 – English – II	4	3	3	75	25	100
3.	Part III - Thermal Physics and Acoustics	6	4	3	75	25	100
4.	Part III - Physics Practical -I	3	2	3	60	40	100
5.	Part III - Mathematics – II (Allied)	9	5	3	75	25	100
6.	Part IV - Basic Tamil II (or) Part IV - Non-Major Elective	2	2	3	75	25	100
7	Part IV Soft Skill – Essentials of language and communication level-II	2	3	3	75	25	100
		30	22		510	190	700

THIRD SEMESTER

S.NO	Name of the subject	Ins. Hours	Credit	Exam hours	External Mark	Internal mark	Total
1.	Part 1 – Tamil - III /Sanskrit – III	4	3	3	75	25	100
2.	Part 11 – English – III	4	3	3	75	25	100
3.	Part III – Optics	6	4	3	75	25	100
4.	Part III - Physics Practical -II	3**	2	3			
5.	Part III - Chemistry –I (Allied)	6	4	3	75	25	100
6.	Part III - Allied Practical	3**	1	3			
7.	Part IV Soft Skill – Computing Skill level I	2	3	3	75	25	100
8	Part IV – Environmental studies	2		*			
		30	20		375	125	500

***Examination will be held only in IV semester**

**** Practical examination at the end of the even semester.**

FOURTH SEMESTER

S.NO	Name of the subject	Ins. Hours	Credit	Exam hours	External Mark	Internal mark	Total
1.	Part 1 – Tamil - IV /Sanskrit – IV	4	3	3	75	25	100
2.	Part 11 – English – IV	4	3	3	75	25	100
3.	Part III – Electricity and Electromagnetism	6	4	3	75	25	100
4.	Part III - Physics Practical -II	3	2	3	60	40	100
5.	Part III - Chemistry – II (Allied)	6	4	3	75	25	100
6.	Part III - Allied Practical	3	1	3	60	40	100
7.	Part IV Soft Skill – Computing skills level II	2	3	3	75	25	100
8.	Part IV – Environmental Studies	2	2		75	25	100
		30	22		570	230	800

FIFTH SEMESTER

S.NO	Name of the subject	Ins. Hours	Credit	Exam hours	External Mark	Internal mark	Total
1.	Part III – Atomic Physics	5	4	3	75	25	100
2.	Part III – Nuclear physics and Particle Physics	5	4	3	75	25	100
3.	Part III – Solid State physics	5	4	3	75	25	100
4.	Part III- Basic Electronics	5	4	3	75	25	100
5.	Part III - Physics Practical -III	2	2	**			
6.	Part III - Physics Practical –IV	2	2	**			
7.	Part III - Physics Practical -V	2	2	**			

8.	Project/Elective –I- Numerical Methods***	4	5	3	75	25	100
9.	Part IV – Value Education		2		75	25	100
		30	29		450	150	600

**** Two credit for each semester total 4 credit**

Practical examination at the end of the even semester.

SIXTH SEMESTER

S.NO	Name of the subject	Ins. Hours	Credit	Exam hours	External Mark	Internal mark	Total
1.	Part III – Relativity and Quantum Mechanics	6	4	3	75	25	100
2.	Part III – Mathematical Methods in Physics	6	4	3	75	25	100
3.	Part III – Physics Practical -III	2* *	2	3	60	40	100
4.	Part III – Physics Practical –IV	2* *	2	3	60	40	100
5.	Part III – Physics Practical -V	2* *	2	3	60	40	100
6.	Project/Elective –II- Integrated Electronics***	6	5	3	75	25	100
7.	Project/Elective –III- Microprocessor Fundamentals***	6	5	3	75	25	100
8.	Part V – Extension Activities		1		75	25	100
		30	25		555	245	800

**** Practical examination at the end of the even semester.**

*****Projects (15 credits)/Electives with three courses
(3x5=15 credits)**

Total Credits - 140

APPENDIX – 32 (S)
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(AUTONOMOUS)

B.Sc., PHYSICS
(effective from the academic year 2018 – 2019)

SYLLABUS

SEMESTER I

CORE PAPER 1

MECHANICS AND PROPERTIES OF MATTER

UNIT1: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.

CLASSICAL MECHANICS

Generalised coordinates-configuration space-Lagrange's equation-Hamilton function and Hamilton's equations.

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.

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 – Hooke's law- Elastic constants – Expressions for Poisson's ratio in terms of elastic constants – work done in stretching and twisting a wire – twisting couple on a cylinder – rigidity modulus by static torsion – torsional pendulum – rigidity modulus and moment of inertia.

UNIT 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 – Jaeger'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 by D.S.Mathur, S.Chand & Co., 2ndEdition (2014).
2. Properties of Matter by BrijLal and N.Subramaniam, S. Chand & Co., New Delhi (2004).
3. Properties of Matter by R.Murugesan, S. Chand & Co., New Delhi (2016).
4. Classical Mechanics, Gupta, Kumar and Sharma, PragathiPrakasan Publisher, New Delhi (2015).

BOOKS FOR REFERENCE

1. A Treatise on General Properties of Matter by SenguptaChatterjee(2010).
2. Fundamentals of Physics by D. Halliday, R.Rensick and J. Walker, 8th edition, Wiley, NY (2008).
3. Mathematical Physics with Classical Mechanics by Sathyaprakash, Sultan chand co, New Delhi(2015).

SEMESTER II

CORE PAPER 2

THERMAL PHYSICS AND ACOUSTICS

UNIT 1 :THERMOMETRY AND CALORIMETRY

Platinum resistance thermometer – Callendar 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

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 – Acoustic grating - Ultrasonic flaw detector – Pluse echo system – medical applications.

Acoustics of buildings – reverberation – Absorption coefficient – Sabine’s formula – Acoustics aspects of halls and auditoriums.

BOOKS FOR STUDY

1. Heat Thermodynamics and Statistical Physics by Brijlal and N. Subramanyam, S. Chand & Co, New Delhi (2012).
2. Heat and Thermodynamics by D.S.Mathur, 3rd edition Sulthan Chand & Sons, New Delhi (2008).
3. Thermal Physics and Statistical Mechanics by D. Jayaraman and K.Ilangovan, Viswanathan Printer and Publishers, Chennai (2017).

4. The laws of Thermodynamics by Peter Atkins, Oxford University Press, New Delhi (2010).
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 (2007).

BOOKS FOR REFERENCE

1. Heat and Thermodynamics by Zemansky, McGraw – Hill Book Co. Inc., New York.(2017)
2. Fundamentals of Physics by Resnick Halliday and Walker, 8th edition, , John Wiley and Sons, Asia Pvt.Ltd., Singapore(2008).
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, New York (1971).

SEMESTER III

CORE PAPER 4

OPTICS

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 – Airy's disk – 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. Fraunhofer 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 prisms –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 :LASER AND FIBRE OPTICS

Spontaneous and stimulated emission – population inversion – Einstein's A and B coefficients – derivation. Types of lasers – Nd:YAG, CO₂ , Semiconductor lasers(homojunction and heterojunction) – Industrial and Medical applications.

Principle and Propagation of light in the optical fibres – numerical aperture and acceptance angle – Types of optical fibres - (material, refractive index, mode) –attenuation, dispersion, bending – Fibre Optical Communication system (Block diagram) – Active and passive fibre sensors – Endoscope.

BOOKS FOR STUDY

1. A Text book of Optics by Subrahmanyam N., BrijLal and M.N. Avadhanulu, S.Chand & Co., New Delhi(2016).
2. Optics by Khanna D.R. &Gulati H.R., S.Chand & Co., New Delhi (1979).
3. Optics and Spectroscopy by R.Murugesan and KiruthigaSivaprasath, S. Chand & Co., New Delhi (2006).
4. Introduction to Fibre optics by AjoyGhatak and K.Thyagarajan, Cambridge university Press, (1999).

BOOKS FOR REFERENCE

1. Fundamentals of Physics, by D.Halliday, R. Resnick and J. Walker, Wiley, 8thEdition, New York (2008).
2. Lasers and Non Linear Optics by B.B.Laud,New Age international Pvt Ltd, New Delhi, (2011).
3. Optics by Ajay Ghatak, Tata McGraw-Hill publishing Co. Ltd., New Delhi(1998).
4. Fundamentals of Laser by William Silfvast , Cambridge University Publication, UK (2012).

SEMESTER IV

CORE PAPER 5

ELECTRICITY AND ELECTROMAGNETISM

UNIT 1 : ELECTROSTATIC

Coulomb's inverse square law – Electric Potential – Gauss theorem and its applications (Intensity at a point due to charged sphere & cylinder) – Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charges.

UNIT 2 : AC AND DC CURRENT

Alternating EMF – Alternating EMF applied to circuits containing L and R – C and R – Alternating EMF applied to circuits containing L, C and R – Series and Parallel resonance circuits – Sharpness of resonance – Q factor – Power in AC circuits – Power factor – Wattless current.

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.

UNIT 3 : 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 4 : 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.

UNIT 5 : MAXWELL'S EQUATIONS AND ELECTROMAGNETIC THEORY

Basic equations – displacement current – Maxwell's modification in Ampere's law – Maxwell's equations in free space – Hertz Experiment – Poynting's theorem – energy per unit volume.

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. Electricity and Magnetism by R. Murugesan, S.Chand & Co., New Delhi, (2008).
5. Introduction to Electrodynamics by D.J. Griffiths, Printice Hall of India Pvt. Ltd., 4rd Edition, New Delhi, (2012).

BOOKS FOR REFERENCE

1. Electricity & Magnetism by K.K.Tewari, S.Chand & Co., New Delhi, (2002).
2. Fundamentals of Physics, D.Halliday, R.Resnick and J. Walker, Wiley, 8th Edition, New York, (2008).
3. Electricity and Magnetism by J.H.Fewkes and John Yarwood, Univesity Tutorial Press, (1985).
4. Electricity and Magnetism by A.N Matveev, Mirpublishers, Moscow

SEMESTER V

CORE PAPER 7

ATOMIC AND MOLECULAR PHYSICS

UNIT -1 :PHOTOELECTRIC EFFECT

Richardson and Compton experiment – Laws of photoelectric emission – Einstein photoelectric equation – Millikan’s experiments – verification of photoelectric

equation – photo electric cells - photo emissive cells - photo conducting cell – photomultiplier.

UNIT 2 : 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.

UNIT 3 : ATOMIC STRUCTURE

Bohr and Sommerfeld 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 – spatial quantisation– Bohr magneton– 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. Anomalous 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 :MOLECULAR SPECTROSCOPY

Introduction – Electromagnetic spectrum – Types of molecular energies - Different spectroscopic methods – quantization of energy – regions of the spectrum - Spectral line width, Natural line width - Classification of molecule – Raman scattering – Classical and Quantum theory – Rotational Raman spectra – Linear, Symmetric, Spherical and Asymmetric Top Molecules – Raman Instrumentation- Infrared spectroscopy – Vibrational energy of a Diatomic molecule – Selection Rule – IR spectrometer - Instrumentation.

BOOKS FOR STUDY

1. Modern Physics by R. Murugesan, KiruthigaSivaprasath, S. Chand & Co., New Delhi, (2008).
2. Modern Physics by D.L.Sehgal, K.L.Chopra and N.K.Sehgal. Sultan Chand& Sons 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 BrijLal, S. Chand & Co. 5th Edition, New Delhi, (2000).
5. Molecular structure and spectroscopy by Aruldhas, Prentice Hall of India Pvt. Ltd., New Delhi (2015).

BOOK 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, 8th Edition, New York, (2008).
4. Modern Physics by Kenneth S.Krane, John Willey & sons, Canada, (1998).
5. Spectroscopy by GurdeepChatwal, Sham Anand, Himalaya Publishing House(2000).

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–thermoluminescencedosimetry (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 model.

BOOKS FOR STUDY

1. Atomic and Nuclear Physics by N. Subrahmanyam and Brijlal, S Chand & Co., New Delhi, (1996).
2. Nuclear Physics by K.Ilangovan, MJP Publishers, Chennai (2012).
3. Nuclear Physics by Tayal D.C., Himalaya Publishing House, Mumbai, (2006).
4. Nuclear Physics by R.C.Sharma, K.Nath & Co., Meerut (2000)
5. Nuclear Physics by Irving Kaplan, Narosa Publishing house, New Delhi. (2006).
6. Nuclear Physics by Devanathan, Narosa Publishing House, India (2012).

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, McGraw-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

5. Introduction to Elementary Particles by D.Griffiths, Harper and Row, New York (1989).

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:CONDUCTING MATERIALS

Conductors – Classical free electron theory of metals – Electrical and Thermal conductivity – Wiedemann – Franz law – Lorentz number – Drawbacks of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi function – Density of energy states – Carrier concentration in metals

UNIT 3:SEMICONDUCTING MATERIALS

Intrinsic semiconductor – carrier concentration deviation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – compound semiconductors – direct and indirect band gap – derivation of carrier concentration in n-type and p-type semiconductor – variation of Fermi level

with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – Applications.

UNIT 4 :MAGNETIC AND SUPERCONDUCTING MATERIALS

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and ferromagnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites and its applications
superconductivity : properties- Type I and Type II superconductors – BCS theory of superconductivity (Qualitative) – High T_c superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT 5 :DIELECTRIC PROPERTIES

Electric susceptibility - dielectric constant – electronics, ionic, orientational and space charge polarization – frequency and temperature dependence of polarization- internal field - Clausius – Mossoti relation(derivation) – dielectric loss – dielectric breakdown – Uses of dielectric materials (capacitor and transformer) – ferroelectricity and applications.

BOOKS FOR STUDY

1. Solid State Physics by S.O.Pillai, New Age International (P) Ltd.,(2002).
2. Solid State Physics by K. Ilangoan, MJP Publishers(2013).

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).
5. Solid State Physics by P.K.Palanisamy, Scitech Publication Inida, (2011).

BOOKS FOR REFERENCE

1. Solid State Physics Principles and Applications by R.Asokamani, Anshan Ltd., 1st Edition,(2006)
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).
4. Elementary Solid State Physics Principles and Applications by M. Ali Omar, Addison Wesley Publish Com., USA.(1974).

CORE PAPER 10

BASIC ELECTRONICS

UNIT 1 :SEMICONDUCTORSAND DIODES

Bandgap – 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– Rectifiers – Half wave –Full wave and bridge rectifiers – Zener diode – characteristics of Zener diode – Zener diode as voltage regulator.

UNIT 2:TRANSISTOR AMPLIFIER

Transistor – different modes of operations – CB mode & CE mode –Single stage CE amplifier–RC coupled amplifier – frequency response – analysis of low, mid and high frequency regions –Power amplifiers – classification of amplifiers – class A power amplifier – push pull, class B power amplifier – emitter follower.

UNIT 3: 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

Clipping and clamping circuits – biased clipper – integrating and differentiating circuits – RC time constant – Multivibrators – astable, monostable and bistablemultivibrator– using transistors.

UNIT 5: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 – PragatiPrakashan – Meerut(2002).
2. Principles of Electronics by V.K. Mehta, Rohit Mehta S. Chand & Co.(2006).
3. Basic Electronics by B.L. Theraja, S. Chand & Co., (2008).

BOOKS FOR REFERENCE

1. Electronic Devices by Mittal.G.K., G.K. Publishers Pvt. Ltd., (1993).
2. Elements of Electronics by M.K.Bagde and Singh S.P., S. Chand & Co., New Delhi(1990).
3. Solid State Electronics by Ambrose and Vincent Devaraj, Meera Publication.
4. Applied Electronics by R.S. Sedha, S. Chand & Co.(1990).

SEMESTER V

ELECTIVE I

NUMERICAL METHODS

UNIT1:SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS

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

UNIT2:NUMERICAL SOLUTION OF ALGEBRAIC, TRANSCENDENTAL AND DIFFERENTIAL EQUATION

Bisection method – Regulafalsi method – Newton – Raphson method–Horner's method – Solution of ordinary differential equation – Euler's method.

UNIT3: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.

UNIT4:CURVE FITTING

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

UNIT5: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).
4. Numerical Methods by G.Balaji, G.BalajiPublisher,Chennai (2013).
5. Numerical methods and computers by S.S Kuo, Addison – Wesley, London(1966)

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).

SEMESTER VI

CORE PAPER 11

RELATIVITY, QUANTUM AND STATISTICAL 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 – Four vectors – Elementary ideas of general relativity.

UNIT 2 : WAVE NATURE OF MATTER

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

UNIT 3 : SCHRÖDINGER EQUATION

Inadequacy of classical mechanics – Basic postulates of quantum mechanics – Properties of wave function – Probability interpretation of wave function – expectation value – Schrödinger equation – Free particle solution – Particle in a box – Potential well of finite depth (one dimension) – linear harmonic oscillator – rigid rotator and hydrogen atom.

UNIT4 :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.

UNIT5 :STATISTICAL MECHANICS

Basic concepts – Quantum ideal gas – Maxwell – Boltzmann statistics – Application of M.B statistics to molecular energies in an ideal gas – B - E statistics – Application of B - E statistics to photon gases – F - D statistics –Application of F.D statistics to electron gas – Comparison of three statistics.

BOOKS FOR STUDY

1. Quantum Mechanics by V.K.Thankappan, New Age International (P) Ltd., Publishers, New Delhi(2012).
2. Modern Physics by R. Murugesan and KiruthigaSivaprasath, S. Chand & Co.,(2015).
3. Quantum Mechanics by V.Murugan, (1st edition) Pearson Edition(2014).
4. A Text book of Quantum mechanics by P.M.Mathews and S.Venkatesan,Tata McGraw-Hill, New Delhi(2017).

5. Heat Thermodynamics and Statistical Physics by Brijlal and N. Subramanyam, S. Chand & Co, New Delhi (2012).
6. Thermal Physics and Statistical Mechanics by D. Jayaraman and K. Ilangoan, Viswanathan Printer and Publishers, Chennai (2017).

BOOKS FOR REFERENCE

1. Concepts of modern physics by A. Beiser. Tata McGraw-Hill, 7th edition, New Delhi (2017).
2. Introduction to quantum mechanics by Pauling and Wilson, McGraw-Hill.
3. Quantum mechanics by A. Ghatak and Loganathan, Macmillan India Pvt. Ltd.
4. Quantum Mechanics by Walter Greiner, 3rd edition.
5. Quantum Mechanics by Leonard and Schiff, 3rd edition, McGraw-Hill Publishers.
6. Fundamentals of Quantum Mechanics by Y.R. Waghmare, S. Chand. (2014).

CORE PAPER 12

MATHEMATICAL METHODS IN PHYSICS

UNIT 1 : MATRICES

Characteristic equation of a matrix – Eigenvalues and Eigenvectors – Hermitian and Unitary matrices – Properties

of their eigenvalues and eigenvectors – Diagonalisation of matrices.

UNIT 2 : 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 3: 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 4: 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 5 :FOURIER SERIES

Definition of fourier series – finding fourier coefficients for a given periodic function with period 2π – odd & even functions in evaluating Fourier coefficients – Half range sine & cosine series.

BOOKS FOR STUDY

1. Mathematical Physics by SathyaPrakash, Sultan Chand and Sons, New Delhi (1996).
2. Mathematical Physics by B.D. Gupta, Vikas Publishing House Pvt. Ltd., New Delhi (1996).

BOOKS FOR REFERENCE

1. Advanced Engineering Mathematics by E.Kreyszig, Eighth Edition, Wiley Publishers, New York(1989).
2. Complex Variables and Applications by Ruel Churchill and James Brown, McGraw Hill Education.
3. Mathematical methods for Physicsts by George Brown Arfken and Hans Jurgen Weber, Harcourt/Acadamicpres(2001)

SEMESTER VI

ELECTIVE2

INTEGRATED ELECTRONICS

UNIT1:FUNDAMENTAL DIGITAL ELECTRONICS

Introduction to decimal, binary, octal, hexadecimal number systems– Binary addition – subtraction (1's and 2's complement method) – multiplication – division – Interconversions – BCD code, Excess–3 code, Gray code – Boolean algebra –Basic laws of Boolean algebra – Demorgan's theorems – NAND and NOR as universal

building blocks – simplification of logical expressions – using (i) Boolean algebra, (ii) Karnaugh map.

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

Flip Flop– RS – Clocked RS – T and D flip flops – JK and Master Slave flip flop –Registers–Shift registers – SISO and SIPO shift registers –Counters – Ring and twisted ring counter – synchronous and ripple counters – BCD counter – 4 bit Up/Down counters.

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 – astablemultivibrator – 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

UNIT1 :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.

BOOKS FOR REFERENCE

1. Introduction to microprocessor by AdityaMathur – Tata McGraw Hill Publishing Company Ltd., (1987).
2. Microprocessor and digital system by Douglas V. Hall – 2nd Edition – McGraw Hill Company(1983).

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 Microscope)
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 glass prism
14. Spectrometer – refractive index of a liquid
15. P.O. Box – Temperature coefficient of resistance

16. Potentiometer – Internal resistance
17. Potentiometer – Calibration of low range voltmeter.
18. Carey Foster's bridge – Specific resistance of a given wire.

PRACTICAL - II

(Practical Examination at the end of Fourth semester)

1. Young's modulus – cantilever – depression – (Static method) – (Scale and telescope)
2. Rigidity modulus – Static torsion
3. Compound pendulum – g and k
4. Sonometer – A.C. Frequency – Steel and Brass wires
5. Melde's string – frequency, Relative Density of a solid and liquid
6. Thermal conductivity of a bad conductor – Lee's disc method
7. Spectrometer – μ of a glass prism – i - d Curve
8. Spectrometer – Grating N and λ – minimum deviation method
9. Air wedge – Thickness of a wire
10. m and B_H – deflection magnetometer Tan C position and vibration magnetometer

11. Carey Foster bridge – Temperature coefficient of resistance of a coil
12. Potentiometer – Specific resistance of a given wire.
13. Potentiometer – Ammeter calibration.
14. Figure of merit of galvanometer (Mirror Galvanometer Or Table Galvanometer)
15. Comparison of EMF's of the given cells using B.G
16. Comparison of capacitance of the given capacitors using B.G
17. Emissivity of surface by calorimeter (drawing cooling Curve).

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. Spectrometer – Grating N & λ normal incidence method.
7. Newton's rings – R and μ of convex lens.
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.

PRACTICAL-IV

(Practical Examination at the end of Sixth Semester)

(Any Fifteen Experiments)

1. Zener diode – Characteristics
2. Junction diode – Characteristics.

3. Transistor CE configuration.
4. A.C. Circuit – LCR – Series resonance
5. A.C. Circuit – LCR – Parallel resonance
6. Bridge rectifier – Zener regulated power supply – 9V characteristics.
7. R–C Coupled Single Stage Amplifier – Frequency Response
8. R–C Coupled Amplifier with feedback.
9. Emitter follower
10. Transistor – Phase Shift Oscillator
11. Transistor – Wien's Bridge Oscillator
12. FET characteristics
13. FET amplifier
14. UJT characteristics
15. UJT Relaxation oscillator
16. SCR characteristics
17. Transistor – Astablemultivibrator
18. Transistor – Bistablemultivibrator
19. NAND / NOR as universal gates.
20. Half Adder – Full adder – Ex–OR(7486)

21. Half Subtractor – Full subtractor – Ex – OR(7486)

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 PHYSICS PAPER FOR B.Sc., MATHEMATICS

ALLIED PHYSICS PAPER – I

UNIT1: 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.

UNIT2: 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.

UNIT4 :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 – BiotSavart’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 : LASER PHYSICS

Spontaneous and stimulated emission – population inversion – Einstein’s A and B coefficients – derivation. Types of lasers – Nd:YAG, CO₂ , Semiconductor lasers(homo junction and hetro junction) – Industrial and Medical applications.

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,NewDelhi(2001).

3. Properties of Matter by BrijLal 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
6. Lasers and Non Linear Optics by B.B.Laud,New Age international Pvt Ltd, New Delhi, (2011).

BOOKS FOR REFERENCE

1. Fundamentals of Physicsby ResnickHalliday 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. Electricityand 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.InterferenceColours 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. Subramaniam, National Publishing Co., 2nd Edition, Chennai(2001).

BOOKS FOR REFERENCE

1. Fundamentals of Physics by Resnick Halliday and Walker, John Wiley 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 FOR B.Sc.,
MATHEMATICS**

ALLIED 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
18. NOR 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 ThalpathyComptek Publishers.

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

APPLIED PHYSICS – I

UNIT1: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.

UNIT2: THE BASIC TRANSISTOR

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.

UNIT3: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.

UNIT4: 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 – CO₂ laser – Ruby laser – semiconductor laser – applications.

UNIT5:FIBER OPTICS

Introduction –types of optical fibers – fibers materials – attenuation – dispersion fiber optic light sources – detectors – fiber optic communication.

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.
4. Lasers and Non-Linear Optics – B.B.Laud,New age International PVT. Ltd, 2011.
5. Optoelectronics – Ghatak and Thiyagarajan, Cambridge University press, 1989.

APPLIED PHYSICS– II

UNIT1:ELECTRICAL PROPERTIES OF METALS

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, Alloying, Pressure, Strain, Magnetic field and environment.

UNIT2:MAGENETIC MATERIALS

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.

UNIT3:DIELECTRICS

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:SUPERCONDUCTORS

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.ApplicationsCrypton, 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.

BOOK FOR STUDY AND 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. Seta& Gupta; “Course in electrical Engg materials”; Dhanpat Raj & Sons 1990.

NON-MAJOR ELECTIVE PAPERS

ASTROPHYSICS

UNIT1:ASTRONOMICAL INSTRUMENTS

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

UNIT2 :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.

UNIT4:STELLAR EVOLUTION

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

UNIT5:THEORIES OF THE UNIVERSE AND GALAXIES

Origin of the Universe– the big bang theory–the steady state theory–the oscillating universe theory – Hubble’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.Murugesan, 11th edition, S.Chand & Company Ltd, New Delhi (2003).
3. Astronomy by S.Kumaravelu, Janki Calendar Corporation, Sivakasi (1993).
1. Astronomy by Baker and Fredrick, 9th edition, Van Nostrand Reinhold Co, New York (1964).
2. Illustrated World of Science Encyclopedia –Vol I to VIII, Creative World Publications, Chicago.
3. Modern Physics by Kenneth S.Krane, John Wiley & Sons Inc., NY (1983).

EVERYDAY PHYSICS

UNIT1

Physics behind Home appliances – Light bulb – Fan – Hair drier – Television – Air Conditioners – microwave ovens – Vacuum cleaners – Dishwasher – Washing machines

UNIT2

How things work – Basic principles – Rape recorder – Taps – Lifts – Submarines – Jet planes – Helicopters – Rockets – fax machines – Pagers – Cellular phones

UNIT3

Demonstration – making a switch board with multiple points – wiring – one lamp controlled by one switch/Two switches – fixing a fuse – soldering – P.C.B Preparation

UNIT4

Study of resistors, chokes, Capacitors and Transformers – multimeter – Basic principles – measurement of resistance, Voltage AC & DC

UNIT5

Servicing of domestic appliances – iron box – mixie – grinder – motor – emergency lamp

BOOKS FOR STUDY

1. The Learner's series – Everyday science – Published by INFINITY BOOKS, NewDelhi
2. The Hindu speaks on Science, Vol I & II, KasturiRanga Publishers, Chennai

BOOKS FOR REFERENCE

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

2. Physics, Vols I, II, III by D.Halliday, R.Resnick and K.S.Krane, 4th Edition, Wiley, New York (1994).
3. The Feymann Lectures on Physics Vols I, II, III by R.P. Feynmann, R.B. Leighton &M. Sands, Narosa, New Delhi (1998).

BASIC PHYSICS

UNIT1:MECHANICS

Force – Weight – Work – Energy – Power – Horsepower
– Centrifuge – Washing machine

UNIT2:HEAT

Variation of boiling point with pressure – Pressure
cooker – Refrigerator – Air conditioner – Principle and their
capacities – Bernoulli principle – Aero plane

UNIT3:SOUND AND OPTICS

Sound waves – Doppler effect – Power of lens – Long
sight and short sight – Microscope – Telescope – Binocular –
Camera

UNIT4:GEOPHYSICS AND MEDICAL PHYSICS

Earthquake – Richter scale – thunder and lightning –
Lightning arrestors – Cosmic showers – X - rays –
Ultrasound scan – CT scan – MRI scan

UNIT5:SPACE SCIENCE AND COMMUNICATION

Newton's law of gravitation – Weather forecasting and communication satellites – Indian satellites – Electromagnetic spectrum – Radio waves – AM and FM transmission and reception

BOOKS FOR STUDY

1. The Learner's series – Everyday science – Published by INFINITY BOOKS, New Delhi
2. The Hindu speaks on Science, Vol I & II, Kasturi & Sons, Chennai

BOOKS FOR REFERENCE

1. Fundamentals of Physics by D. Halliday, R. Resnick and J. Walker, 6th edition, Wiley, NY (2001).
2. Physics, Vols I, II, III by D. Halliday, R. Resnick and K.S. Krane, 4th Edition, Wiley, New York (1994).
3. The Feynmann Lectures on Physics Vols I, II, III by R.P. Feynmann, R.B. Leighton & M. Sands, Narosa, New Delhi (1998).

NON-CONVENTIONAL ENERGY SOURCES

UNIT1:SOLAR ENERGY

Conventional Energy sources – Renewable Energy sources – solar energy – solar radiation and its measurements –

solar energy collectors–parabolic collector–storage of solar energy

UNIT2 :APPLICATIONS OF SOLAR ENERGY

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

UNIT3 :WIND energy

Basic principles of wind energy conversion–power in the wind – forces inthe Blades–wind energy conversion–Advantages and disadvantagesof wind energy conversion systems (WECS)Energy storage–Applications of wind energy

UNIT4 :OCEANIC ENERGY

Energyfrom the oceans–Energyutilization–Energyfrom tides–Basic principle of tidal power – Utilization of tidal energy

UNIT5 :ENERGYFROM OTHER SOURCES

Chemicalenergy – Nuclearenergy – Energy storage and distribution

BOOKS FOR STUDY

1. Non–conventionalsources of energy by G.D. Rai, 4th edition,Khanna Publishers, New Delhi (1996).
2. SolarEnergy, Principles of thermal collection and storage by S.P.Sukhatme 2nd edition, TataMcGraw - Hill Publishing Co. Ltd.,New Delhi (1997).

BOOK FOR REFERENCE

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