PERIYAR UNIVERSITY, SALEM.11
REGULATIONS

1. Eligibility
Candidates seeking admission to first year of the Bachelor of Science – Physics shall be required to have passed the Higher secondary examination with Mathematics, Physics and Chemistry conducted by the Government of Tamilnadu or an examination accepted as equivalent thereto by the Syndicate subject to the conditions as may be prescribed thereto are permitted to appear and qualify for B.Sc., `(Physics) degree examination of this University after a course of study of three academic years.

2. Duration of the Course:
The course for the degree of Bachelor of Science shall consist of three academic years.

3. Course of Study
The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.

I YEAR
1. Language – I (Tamil etc)
2. English – I
3. Major I
4. Major II
5. Allied Maths
6. Major Practical I

II YEAR
5. Language – II
6. English II
7. Major – III
8. Major IV
8. Major Practical II
9. Allied Chemistry
10. Allied Chemistry Practicals

III YEAR
11. Major V
11. Major VI
12. Major – VII
13. Major – VIII
14. Elective
15. Major Practical III
16. Major Practical IV

4. Examinations:
The theory examination shall be three house duration to each paper at the end of each year. The candidates failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examination.
The practical examination for UG course should be conducted at the end of year.

5. Scheme of Examinations:
The Scheme of Examination of different semester shall be as follows:
<table>
<thead>
<tr>
<th>S.No</th>
<th>Paper</th>
<th>Title of Paper</th>
<th>Duration</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Year</td>
<td></td>
<td></td>
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<tr>
<td>1.</td>
<td>Language</td>
<td>Language-I</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>2.</td>
<td>English</td>
<td>English-II</td>
<td>3</td>
<td>100</td>
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<tr>
<td>3.</td>
<td>Major I</td>
<td>Mechanics and Sound</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>4.</td>
<td>Major II</td>
<td>Heat and Properties of matter</td>
<td>3</td>
<td>100</td>
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<tr>
<td>5.</td>
<td>Major</td>
<td>Major Practical I</td>
<td>3</td>
<td>100</td>
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<tr>
<td>6.</td>
<td>Allied</td>
<td>Allied Mathematics</td>
<td>3</td>
<td>150</td>
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<tr>
<td>II year</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Language</td>
<td>Language-II</td>
<td>3</td>
<td>100</td>
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<tr>
<td>8.</td>
<td>English</td>
<td>English-II</td>
<td>3</td>
<td>100</td>
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<tr>
<td>9.</td>
<td>Major III</td>
<td>Optics and Spectroscopy</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>10.</td>
<td>Major IV</td>
<td>Mathematical Physics</td>
<td>3</td>
<td>100</td>
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<tr>
<td>11.</td>
<td>Major</td>
<td>Major Practical-II</td>
<td>3</td>
<td>100</td>
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<tr>
<td>12.</td>
<td>Allied</td>
<td>Allied Chemistry</td>
<td>3</td>
<td>100</td>
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<tr>
<td>13.</td>
<td>Allied</td>
<td>Allied Chemistry Practical</td>
<td>3</td>
<td>50</td>
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<tr>
<td>III year</td>
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<tr>
<td>14.</td>
<td>Major V</td>
<td>Electricity and Magnetism</td>
<td>3</td>
<td>100</td>
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<tr>
<td>15.</td>
<td>Major VI</td>
<td>Atomic and Nuclear Physics</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>16.</td>
<td>Major VII</td>
<td>Quantum mechanics and relativity</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>17.</td>
<td>Major VIII</td>
<td>Electronics</td>
<td>3</td>
<td>100</td>
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<tr>
<td>18.</td>
<td>Electives (Any one of the following Papers)</td>
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<tr>
<td>18A.</td>
<td>Major</td>
<td>Electronics and Communication</td>
<td>3</td>
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<tr>
<td>18B.</td>
<td>Major</td>
<td>Computational Physics</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>18C.</td>
<td>Major</td>
<td>Computer Programming in C</td>
<td>3</td>
<td>100</td>
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<tr>
<td>18D.</td>
<td>Major</td>
<td>Energy Physics</td>
<td>3</td>
<td>100</td>
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<tr>
<td>19.</td>
<td>Major</td>
<td>Major Practical-III</td>
<td>3</td>
<td>100</td>
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<tr>
<td>20.</td>
<td>Major</td>
<td>Major Practical-IV</td>
<td>3</td>
<td>100</td>
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</table>

Total Marks 2000

6. Question Paper Pattern:

**Time: 3 Hours**

**Max Marks-100**

Part A: 10 x 2 = 20

(Answer all questions)

(Two questions from each unit)

Part B: 5 x 4 = 20

(Answer all questions)

(One question from each unit with internal choice)

Part C: 5 x 12 = 60

(Answer all questions)

(One question from each unit with internal choice)

(In Part B out of total 10 question 4 questions may be problem oriented)

7. Passing Minimum:

The candidate shall be declared to have passed the examination if the candidate secures not less than 40 marks in the University examination in each theory paper. For the practical paper a minimum of 40 marks out of 100 marks is required.
marks in the University examination and the record notebook taken together is required to Pass the examination. There is no passing minimum for record notebook. However submission of record notebook is a must.

8. Classification of Successful candidates:
Candidates who secure not less than 60% of the aggregate marks in the whole examination in First Class.
All other successful candidates shall be declared to have passed in Second Class.
Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed in First Class with Distinction provide they pass all the examinations prescribed for the course at first appearance.
Candidates who pass all the examinations prescribed for the course in the first attempt and within a period of three academic years from the year of admission to the course alone are eligible for University Ranking.

9. Maximum duration for the completion of UG Program:
The maximum duration for the completion of UG Program shall not exceed six years.

10. Commencement of this Regulation:
These regulations shall take effect from the academic year 2007-08 and thereafter.

11. Pattern of Question Paper for Practical Examinations;
Each set of question paper should contain SEVEN questions and the candidate has to choose one by lot.

12. Awarding of marks for Practical examinations.
Total Marks: 100 (Practical 80 Marks + Record 20 Marks)
Distribution for 80 Marks:

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
</tr>
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<tbody>
<tr>
<td>Formula, circuit diagram and tabular column</td>
<td>16 Marks (20%)</td>
</tr>
<tr>
<td>Observation</td>
<td>32 Marks (40%)</td>
</tr>
<tr>
<td>Result</td>
<td>8 Marks (10%)</td>
</tr>
<tr>
<td>Presentation</td>
<td>8 Marks (10%)</td>
</tr>
<tr>
<td>Total</td>
<td>80 Marks</td>
</tr>
</tbody>
</table>
SYLLABUS

Paper-I  MECHANICS AND SOUND

UNIT: I
PROJECTILE: Range up and down and inclined plane-maximum range-two directions of projection for a given velocity and range.
IMPULSE-IMPACT: Laws or impact – coefficient of restitution –impact of a smooth sphere on a fixed smooth plane-Direct impact between two smooth spheres-Losses in kinetic energy in direct impact-Oblique impact between two smooth spheres.

UNIT: II
SHM: Composition of two SHM’s of same period along a straight line and at right angles to each other-Lissajous figures.
DYNAMICS OF RIGID BODIES: Compound pendulum-theory-condition for minimum period-interchangeability of center of suspension and center of oscillation-g using compound pendulum-Bifilar pendulum-parallel and non-parallel threads.

UNIT: III
CENTER OF GRAVITY: Center of gravity of a solid cone, Solid hemisphere, hollow hemisphere and a tetrahedron.
FRICITION: Laws of friction-angle of friction-resultant reaction and cone of friction-equilibrium of a body on an inclined plane under the action of a force.
CENTER OF PRESSURE: Definition-center of pressure of a rectangular lamina and triangular lamina.
ATMOSPHEREIC PRESSURE: Variation of atmospheric pressure with attitude-height of homogenous atmosphere.

UNIT: IV

UNIT: V
SOUND: Theory of damped and forced vibrations-sharpness of resonance-Fourier theorem -application for saw tooth wave and square wave.
ULTRASONICS: Production-piezoelectric crystal method-magnetostriction method-detection properties-applications.
ACOUSTICS OF BUILDINGS: Reverberation-derivation of Sabine’s formula- determination of absorption coefficient.

BOOKS FOR STUDY:
   The National Publishing Company.
   By M.Narayanamurti and M.Nagarathnam.
The National Publishing Company
   By R.Murugesan. S.Chand and Co.

BOOKS FOR REFERENCE:
   Atmaram and Sons.
   By M.Ghosh.S.Chand & Co
   By R.L.Saighal.S.Chand & Co
   By N. Subrahmanyam and Brijlal S.Chand and Co.,
   Addison Wesley Publications
PAPER II - THERMAL PHYSICS AND PROPERTIES OF MATTER

UNIT-I
Joule-Thomson effect- porous plug experiment- Theory- Adiabatic demagnetisation
Liquefaction of air, nitrogen, Helium gases- Practical applications of low temperature- Refrigerators- Air conditioning machines- effect of chloro fluoro carbon on ozone layer.

Unit II
Zeroth, first, second and third laws of thermodynamics- Heat engines- Carnot, Otto and Diesel engines- Working and efficiency-entropy- Change in entropy in reversible and irreversible processes- temperature-entropy diagram- Maxwell’s thermodynamic relations-applications- Tds equations- Clausius – Clapeyron latent heat equations

Unit- III
Thermal conductivity- Forbes method- Lee’s disc method- Black body radiation- Wien’s law-
Rayleigh Jeans law- Planck’s law- Stefan’s law- Determination of Stefan’s constant- Pyrometers-
Pyrheliometers- Solar constant- determination of temperature of sun.

Unit-IV
Bending of beams- expression for bending moment-depression of the loaded end of cantilever –
uniform and nonuniform bending- theory and experiment-Koenigs method- theory and experiment- I form of girders- Torsion- expression for couple per unit twist- Torsion pendulum theory and experiment- Static torsion method of determining rigidity modulus.

Unit V
Coefficient of viscosity- Oswald’s viscometer-Searle’s viscometer-Theory and experiment- Viscosity of gases- Meyer’s formula-Rankine’s method

Surface tension- excess pressure inside a curved surface-surface tension and interfacial surface tension-
method of drops- Quincke’s method- surface tension and angle of contact of mercury-variation of surface tension with temperature.

Books for study and reference.
2. Heat and Thermodynamics D. S. Mathur S Chand & Co New Delhi 2005
PHYSICS MAIN PRACTICALS –I

1. Young’s modulus – Non uniform Bending – pin & microscope method
2. Young’s modulus – uniform bending – scale and telescope method
3. Torsion pendulum – dynamic method – Rigidity Modulus
4. Surface tension and interfacial surface tension – Drop Weight method
5. Sonometer – frequency of a fork
6. Sonometer – R.D of a solid and liquid
7. Specific heat capacity of a liquid – Method of a mixtures – Barton’s correction
8. Spectrometer i–d curve
9. Spectrometer – Grating – Standardization – normal incidence measurement of Wavelength
10. Potentiometer – calibration of low range Voltmeter
11. Potentiometer – Internal resistance of a cell
12. Field along the axis of a coil – deflection magnetometer
13. P O Box – Temperature coefficient of resistance
14. Joule’s calorimeter – Specific heat capacity of a liquid – Barton’s correction
15. B. G current and voltage sensitive
16. B. G charge sensitivity
17. Bridge rectifier
18. Zener diode – Voltage regulator
19. Low range power pack
20. NAND, NOR gates as Universal Building Block
UNIT-I
Newton’s rings in reflected light-determination of wavelength and refractive index-
Michelson interferometer-construction and working-types and visibility of fringes-
determination of wavelength, resolution of spectral lines, refractive index and thickness of a
thin sheet.

Unit II
Fresnels assumptions- rectilinear propagation of light-zone plate- action for plane and
spherical wave fronts-comparison of zone plate and convex lens- Fresnel and Fraunhofer
diffraction-Plane diffraction grating-normal and oblique incidence-determination of
wavelength using grating-dispersive power of grating- resolving power of telescope,
microscope, prism and grating.

Unit III
Double refraction- Nicol prism- Optical activity- Fresnel’s explanation- specific
rotatory power by Laurent’s half shade polarimeter
Optical fibres-propagation of light- acceptance angle- numerical aperture- mode propagation-
step and grade index fibres-absorption, scattering and bending losses- core and cladding
losses-fibre communication advantages- light sources.

UNIT-IV
Rotation spectra of molecules-Theory- instrumentation- applications-Infrared
spectroscopy- energy of diatomic molecule- vibration rotation spectrum- IR spectrometer-
Raman effect- Classical and quantum theory-Pure rotational and vibrational Raman spectra-
Techniques and instrumentation- Applications.

Unit V
Basic theory of NMR, ESR and NQR- Techniques and instrumentation –
applications

Books for study and reference
3.Optic fibres and Fibre Optic Communication systems Subir Kumar Sarkar SChand & Co
   (2003)
Paper IV: Mathematical Physics

UNIT-I Vector space and Tensors
Vector Space- Definitions- Linear independence of Vector- Bilinear and quadratic forms- change of basis- Schmidt’s orthogonalisation processes- Swartz inequality- Application of vectors to hydrodynamics the equation of flow in solids.
Tensors- definitions- N-dimensional space- superscripts- subscripts- coordinate-transformations kronecker delta symbol- properties of kronecker generalized kronecker delta
Tensors of higher ranks- Algebraic operation of Tensors- symmetric and asymmetric Tensors- Application of Tensors- Dynamics of a particle- Elasticity- Rigid bodies

UNIT-II Laplace and Fourier Transforms

Unit III Matrices
Solutions to linear equations- Cramer’s rule- Characteristic matrix and characteristic equations of a matrix – eigen values and eigen vectors – sub space and null spaces- transformations- Hermitian form- diagonalisation of 3 by 3 symmetric matrices.

Unit IV Special Functions
Beta functions - definitions – properties, Gamma functions- definitions- properties- relation between beta and gamma functions- reduction of definite integrals using these functions – Applications
Bessel-Legendre-Laguerre and Hermite differential equation- properties- Generating functions- Rodrigue’s formula- orthogonal properties- recurrence relations

Unit V Numerical Methods

Books For Study
MAIN PRACTICAL –II

1. Young’s modulus – non uniform bending – pin and microscope
2. Young’s modulus – uniform bending – scale and telescope method
3. Torsion pendulum- MI and rigidity modulus – symmetrical masses
6. Specific heat capacity of a liquid by cooling – verification of Newton’s law of cooling .
8. Air wedge thickness of a wire and its insulation.
15. BG Comparison of capacities.
16. BG comparison if EMF’s of two cells.
17. Half and Full adder.
19. Verification of DeMorgan’s theorems.
20. OPAMP- Integrator and differentiator.
PAPER V - ELECTRICITY AND MAGNETISM

Unit I

Unit-II

Unit- III
Growth and decay of currents in LR circuits-growth and decay of charge in CR circuits-determination of high resistance by leakage- growth and decay of charge in LCR circuit-condition for growth and decay to be oscillatory-expression for frequency of oscillation-series and parallel resonant circuits-theory- comparision-Power in LCR circuit-skin effect-Tesla coil.

Unit IV

Unit- V
Fundamental definitions in dielectrics-types of electric polarization-frequency and temperature effects on polarization- Classius – Mosotti relation-determination of dielectric constant-dielectric breakdown-properties and different types of insulating materials.

Books for study:
1. Electricity and Magnetism  R Murugesan  S . Chand & Co
2. Electricity and Magnetism  Narayanamurthy and Nagarrthnam National Publishing Company
3. Material Science  Dr M  Arumugam Anuradha Agencies

Books for reference
1. Electricity and Magnetism  D N Vasudeva S Chand & Co
2. Electricity and Magnetism  K K Tiwari S Chand & Co
3. Introduction to Solid State Physics  C Kittel John Wiley
4. Solid state Physics  Deckker
PAPER VI - ATOMIC AND NUCLEAR PHYSICS

Unit I

Unit II
Spectral terms and notations-fine structure of sodium D lines-fine structure of Hα line- effect of electron spin on fine structure of spectral lines- fine structure of alkali spectra and ionized He- Zeeman effect-Larmor’s theorem- quantum mechanical explanation of normal Zeeman effect- anomalous Zeeman effect of D1, D2 lines of sodium- Paschen Bach effect- Stark effect.

Unit III
Nuclear detectors- solid state detector- proportional counter-cloud chamber-Bubble chamber- scintillation counter-Accelerators-cyclotron-synchrocyclotron-betatron.
Artificial transmutation- Rutherford’s experiment-theory of nuclear disintegration- Q value –threshold energy- types of nuclear reaction- energy balance and Q value-threshold energy of endo energetic reaction- scattering crosssection.

Unit IV

Unit V
Nuclear fission- types of nuclear fission-Bohr Wheeler theory-chain reaction-critical size-critical mass-nuclear fusion- source of stellar energy- Carbon – nitrogen cycle- proton- proton cycle-thermonuclear reaction- controlled thermo nuclear reaction.
Elementary particles-types of interactions-classification of elementary particles-elementary partice quantum number- Baryon number-lepton number-strangeness number-hypercharge-isospin and isospin quantum numbers-conservation laws and symmetry-parity, charge conjugation symmetry- time reversal symmetry-combined inversion of CPT.

Books for study:
1. Modern Physics  R Murugesan S Chand & Co
2. Atomic Physics  J B Rajam S Chand & Co
3. Nuclear Physics D C Tayal Himalaya Publishing Co

Books for reference:
1. A Source book of atomic energy Samuel Glasstone  East West Press
2. Atomic and Nuclear Physics Albright Semat Chapman and Hall
3. Basic Nuclear Physics and Cosmic rays B N Srivatsava Pragati Prakashan
PAPER VII - QUANTUM MECHANICS

UNIT – I

UNIT – II
One dimensional problems – particle in a box – eigen functions and eigen values – linear harmonic oscillator – rectangular potential barrier – one dimensional potential well and infinitely deep potential well – note on tunneling and alpha decay.

UNIT – III

UNIT – IV

Unit V: Special theory of Relativity

TEXT BOOK:
1. R. Murugeshan, Modern Physics, S.Chand & Co., New Delhi, 2005

Reference Book:
1. J.B.Rajam, Modern Physics, S.Chand & Co., New Delhi,
**PAPER VIII - ELECTRONICS**

Unit I

Semiconductor Special Devices

JFET – Construction, characteristics - common source amplifier-Design guide lines –
MOSFETS – depletion and enhancement mode MOSFETS – MOSFETS as switches –UJT -
relaxation oscillator – SCR – Tunnel diode, Gunn diode, PIN diode – IMPATT diode –
DIAC and TRIAC – construction and characteristics.

UNIT – II

Wave form generators and Active filters
Sine wave oscillation with phase shift and wein’s networks-Comparator-Schmitt Trigger-
Astable and Monostable operations-Triangular wave generator.
Active filters-Butterworth filters design-Second order law-Low,High and Band pass filters-
Band notch filter.

UNIT – III

Operational amplifier and analog computation
Operational amplifiers –characteristics and parameters– Mathematical operations –
logarithmic – antilog amplifiers – Analog multiplier and divider – solutions to simultaneous
equations -differential equations, harmonic oscillator, damped harmonic oscillator, rocket
launching.

Unit –IV

Digital Electronics

Number systems- binary, octal hexa- logic gates- Universality of NAND and NOR gates-
binary adder and substractors – Half adder – full adder – half substractor- Full substractor-
Boolean algebra – simplification of Boolean expressions- K.Maps (Simple systems only)-

Unit – V

Registers and Counters

Flip-flops- RS – Clocked RS- D- T- JK – JK M/S flip flops- binary counters- decade
counters- Up/Dn counters - Shift registers- Digital to analog Converters - Binary weighted –
Resistor, DAC – R/2R ladder DAC – Successive approximation method –Single slope and
Dual slope ADC— counter type-Resolution, Accuracy and Linearity.

Books For Study


4. Integrated Electronics – Analog & Digital Circuits and Systems –

5. Operational amplifier – Gayakwad – TMG Hill
MAJOR PRACTICAL III

1. Cantilever- Young’s modulus – mirror and Telescope
2. Static torsion – Ridity modulus
3. Compound pendulum
4. Coefficient of viscosity – ungraduated burette – radius by mercury pellet
5. Kundt’s tube – Young’s modulus – velocity of sound
6. Lee’s disc – thermal conductivity of a bad conductor and emissivity
7. Newton’s rings – refractive index of a lens
8. Spectrometer – I-I’ curve
9. Spectrometer – small angled prism
10. Potentiometer – calibration of high range voltmeter
11. Deflection magnetometer – m and B_H – TAN C position
12. Copper Voltmeter - B_H
13. Principle of multimeter
14. BG – Determination of absolute capacity
15. Determination of Thermo emf- direct method – BG
16. FET characteristics
17. UJT characteristics
18. SCR characteristics
19. Hartley oscillator
20. Colpitt oscillator
MAJOR PRACTICAL – IV

1. Koenig’s method – non uniform bending
2. Koenig’s method – uniform bending
3. Cantilever – dynamic method
4. Bifilar pendulum – parallel threads
5. Viscosity of highly viscous liquid – Searle’s viscometer
6. Thermal conductivity of good conductor – Forbes method
7. Newton’s rings – Refractive index of a liquid
8. Spectrometer – dispersive power of a grating
9. Spectrometer – Cauchy’s constant
10. Potentiometer- emf of a thermocouple
11. Field along the axis of a coil – Vibration magnetometer
12. Carey Foster’s bridge – temperature of coefficient of resistance
13. BG comparison of Capacities – De Sauty’s bridge
14. BG comparison of mutual inductances
15. BG absolute determination of mutual inductance
16. Astable multivibrator using 555 timer
17. Monostable multivibrator using 555 timer
18. Bistable multivibrator using 555 timer
19. Flip flops using gates
20. RC coupled amplifier – single stage
ELECTIVE-I: ELECTRONICS AND COMMUNICATION

UNIT – I

UNIT – II
Demodulation – definition – Diode detection of AM signals – FM detection – Foster Seely discriminator
Radio receivers – straight receivers – TRF receivers – super heterodyne receivers – Block diagram – explanation of each stage – FM receivers – Block diagram – AGC

UNIT – III

UNIT – IV

UNIT–V

Books for study:
2. Electronics communication systems – Kennedy and Davis, TMH
**ELECTIVE-II: PROGRAMMING IN LANGUAGE C**

UNIT-I
Introduction – Basic structure of C – Programs - Character set - Key words and identifiers - constants Variables – Data types – declaration of variables – assigning values to variables – defining symbolic constants, Operators and Expressions

UNIT-II

UNIT-III
Array – Introducing one dimensional & two dimensional arrays - initializing two dimensional arrays.

Handling of character strings

UNIT-IV
User defined functions – form of C functions - Return values & their types - Calling a function - Three categories of functions

Structures and unions - introduction - structure definition - giving values to members – structure initialisation – unions.

UNIT-V
Pointers - introduction – Understanding pointers – accessing the address of a variable – declaring & initializing pointers.

File management - introduction – defining, Opening and closing a file – I/O operation on files.

TEXT BOOKS:
PROGRAMMING IN ANSI C by E. Balagurusamy – Tata McGraw Hill Publications co. Ltd - Ed 2.1

REFERENCE BOOKS:
THE SPIRIT OF C by Mullish Copper - JAICO publications
ELECTIVE-III: ENERGY PHYSICS

UNIT-I
SOLAR ENERGY

UNIT-II
WIND ENERGY
- Basic principles of wind energy conversion- energy estimation - Generating systems – Schemes for electrical generation –generator control – local control – applications of wind energy – energy from waves and tides

UNIT –III
BIO MASS ENERGY

UNIT – IV
ENERGY STORAGE
- Lead acid batteries – rechargeable batteries – UPS – Hydrogen as fuel – liquid petroleum gas energy

UNIT – IV
IMPACTS OF NON-CONVENTIONAL ENERGY
- Energy crisis- possible solutions – energy transportation – patterns of energy consumption in domestics, industrial agricultural sectors- global warming

Books for study
4. Principles of Solar Engineering Kreith & Krieder TMH
5. Solar Energy – M.P Agarwal S Chand & Co.,
ELECTIVE IV - COMPUTATIONAL PHYSICS

UNIT – I:

UNIT – II:

UNIT – III:

UNIT – IV:

UNIT – V: Laboratory Exercise Session (1 hour per week)
The laboratory exercise involves writing programs in C / C++ / FORTRAN / MATLAB to solve problems of numerical techniques for the topics listed above.

Textbook

Supplementary Reading
SAMPLE MODEL QUESTION PAPER

BSc( Physics)

MECHANICS AND SOUND

Time: Three Hours Max: 100 Marks

Answer all the questions

Part- A (10 x 2 = 20 Marks)

1. What are elastic and inelastic collisions?
2. Define coefficient of restitution.
3. What are Lissajou’s figures?
4. Write down the expression for period of a bifilar pendulum with non parallel threads.
5. Define centre of pressure.
6. Define coefficient of friction.
7. What are constraints?
8. Write down transformation equations.
9. What is critical damping?
10. Define sharpness of resonance

Part- B (5 x 4 = 20 Marks)

11.a) Find the velocity of projection of missile which has a horizontal range of 150m if its time of flight for that range is 3 s.
(Or)

b) Derive the relations for the velocities of two smooth spheres impinging obliquely after impact.

12.a) Prove that in a compound pendulum there are four points collinear with the centre of mass of the pendulum about which it has the same period of oscillation
(Or)

b) What is a bifilar pendulum? Derive an expression for its period of oscillation.

13.a) Find the centre of gravity of a solid cone.
(Or)

b) Derive expression for the variation of atmospheric pressure with altitude.
14. a) State and explain the principle of virtual work
(OR).

b) Explain generalised coordinates.

15. a) Explain the properties of ultrasonic waves.
(Or)

b) State and explain Fourier theorem

Part C (5 x 12 = 60 Marks)

(Or)

b) Two smooth spheres impinge directly. Find their velocities after impact. Also calculate the loss of kinetic energy.

17a) Find the resultant of two SHM’s having the same period at right angles to each other. Discuss the result.
(Or)

b) What is a compound pendulum? Obtain an expression for its period of oscillation. Prove that the centre of oscillation and the center of suspension are interchangeable.

18a) Define centre of gravity. Find the centre of gravity of a i) solid hemisphere ii) hollow hemisphere.
(Or)

b) Explain the equilibrium of a body on an inclined plane acted upon by a force.

19a) Derive Lagrange’s equations of motion from D’Alemberts principle
(Or)

b) Using Lagrangian formulation show that the angular momentum is conserved.

20a) Define reverberation time. Derive Sabine’s formula of reverberation time.
(OR)

b) Explain the methods of production of ultrasonic waves and mention its uses.