Syllabus for

B.SC. PHYSICS

(SEMESTER PATTERN)

(For Candidates admitted in the Colleges affiliated to Periyar University from 2017-2018 onwards)
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 Tamil Nadu 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 years divided into six semesters with internal assessment under choice based credit system.

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 SEMESTER**
1. Language -I (Tamil etc)
2. English -I
3. Core -Physics -I (Mechanics)
4. Allied Mathematics -I
5. Value Education

**II SEMESTER**
6. Language -II (Tamil etc)
7. English -II
8. Core Physics -II (Thermal Physics)
9. Core Physics -Practical I
10. Allied Mathematics -II
11. Allied Mathematics -III
12. Environmental Studies
13. Skill based Elective Course -I (Space Science)

**III SEMESTER**
14. Language -III (Tamil etc)
15. English -III
16. Core Physics -III (Properties of matter and Sound)
17. Allied Chemistry -I
B.Sc. PHYSICS

18. Skill based Elective Course -II (Programming in C language)
19. Non -Major Elective Course -I (Essentials of Electricity)

IV SEMESTER
20. Language -IV (Tamil etc)
21. English -IV
22. Core -Physics -IV (Optics)
23. Core -Physics -Practical II
24. Allied Chemistry -II
25. Allied Chemistry -II Practical
26. Non -Major Elective Course II (Physics in Everyday Life)

V SEMESTER
27. Core -Physics -V (Electricity and Magnetism)
28. Core -Physics -VI (Basic Electronics)
29. Core -Physics -VII (Atomic Physics)
30. Core -Physics -Elective I
31. Core -Physics -Elective II
32. SBEC -III (Bio - Medical Instrumentation)
33. SBEC -IV (Digital Electronics)

VI SEMESTER
34. Core -Physics -VIII (Nuclear Physics)
35. Core -Physics -IX (Quantum Mechanics and Relativity)
36. Core -Physics -Elective III
37. Core -Physics -Practical III
38. Core -Physics -Practical IV
39. SBEC -V (Basics of electricity and Appliances)
40. SBEC -VI (Microprocessor and its applications)

Core Electives
Semester V: (Any two of the following)
1. Mathematical Physics and Numerical Methods
2. Solid State Physics
3. Applied Physics
4. Energy Physics
Semester VI: (Any one of the following)

1. Laser and Spectroscopy
2. Electronics and Communication

Skill Based Elective Courses

1. SBEC -I - Space Science
2. SBEC –II - Programming in C language
3. SBEC –III - Bio Medical Instrumentation
4. SBEC -IV - Digital Electronics
5. SBEC -V - Electrical Appliances
6. SBEC -VI - Microprocessor and its Application

Non-Major Elective Courses

1. Essentials of Electricity
2. Physics in Everyday life
3. Examinations

The theory examination shall be three hours duration to each paper at the end of each semester. The candidates failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examination

5. Scheme of Examinations:

The scheme of examination of different semester shall be as follows.
# COURSE OF STUDY AND SCHEME OF EXAMINATION

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<tr>
<th>Part</th>
<th>Paper Code</th>
<th>Subject Title</th>
<th>Hours/Week</th>
<th>Exam Hrs</th>
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* - Examinations will be at the end of II semester

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| II  | II         | English – II  | 6 | 3 | 3 | 25 | 75 | 100 |
| III | Core II    | Physics       | 5 | 3 | 3 | 25 | 75 | 100 |
| III | Core Practical I | Physics Practical - I* | 3 | 3 | - | - | - | - |
| III | Allied III | Maths - III (or) Allied II Chemistry - II | 5 | 3 | 5 | 25 | 75 | 100 |
| III | Allied II  | Maths Paper II (Or) | 2 | 3 | - | - | - | - |
| III | Allied Practical | Chemistry Practical I* | 1 | 3 | - | - | - | - |
| IV  | SBEC - I   | Skill based Elective course- I | 2 | 3 | - | - | - | - |
| IV  |            | Environmental studies* | 1 | 3 | - | - | - | - |

* - Continued from I semester and Examinations will be at the end of II semester
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* - Examinations will be at the end of IV semester

* - Continued from III semester and Examinations will be at the end of IV semester
# B.Sc. PHYSICS

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* - Examinations will be at the end of VI semester

<table>
<thead>
<tr>
<th>Part</th>
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<th>Subject Title</th>
<th>Hours /Week</th>
<th>Exam Hrs.</th>
<th>Credits</th>
<th>University Examination</th>
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<td>External (75%)</td>
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<td>Physics IX</td>
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<td>3</td>
<td>2</td>
<td>25</td>
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</tbody>
</table>

* - Continued from III semester and Examinations will be at the end of VI semester

Total credit for V & VI semester = 57 Credits
Total credit for 3 years = 140 Credits
Question paper pattern for Core and Elective courses

Time : 3 Hrs. Maximum Marks - 75 Marks

Part A: 10 x 2 = 20 Marks
(Answer all Questions)
(Two questions from each unit)

Part B: 5 x 5 = 25 Marks
(Answer all Questions)
(One question from each unit with internal choice, In Part B out of total 10 questions, 4 questions may be problem oriented)

Part C: 3 x 10 = 30 Marks
(Answer any three Questions)
(One question from each unit)

7. PASSING MINIMUM:
Theory:
IA: 25 marks
University Examination: 75 marks

<table>
<thead>
<tr>
<th>Evaluation Of IA</th>
<th>Passing minimum</th>
</tr>
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<tbody>
<tr>
<td>Tests</td>
<td>IA (40%)</td>
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<tr>
<td>Assignment</td>
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<td>-05 marks</td>
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<td>Attendance</td>
<td>Total</td>
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<tr>
<td></td>
<td>-05 marks</td>
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<tr>
<td>Total</td>
<td>-40 marks</td>
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<tr>
<td>UE</td>
<td>75 marks</td>
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</table>

Practical:
IA: 40 marks
University Examination: 60 marks

<table>
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<th>Evaluation Of IA</th>
<th>Passing minimum</th>
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<td>Model Exam</td>
<td>UE (40%)</td>
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<td>-10 marks</td>
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<tr>
<td>Attendance</td>
<td>-40 marks</td>
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<tr>
<td>Total</td>
<td>UE (40%)</td>
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<td>-60 marks</td>
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</table>
University Examination: 60 Marks

Evaluation for university practical examinations

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<tr>
<td>Formula with expansion</td>
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</tr>
<tr>
<td>Observation</td>
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<td>Calculation</td>
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<tr>
<td>Result with units</td>
<td>5</td>
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</tbody>
</table>

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 in the University examination and the record note book taken together is required to pass the examination. There is no passing minimum for record note book however submission of record note book is a must.

A candidate is deemed to have completed a course successfully and earned the appropriate credit, only if, the candidate earned a grade of E and above. RA denotes the candidate should Reappear the course again.

8. CLASSIFICATION OF SUCCESSFUL CANDIDATES:

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed 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.

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Cumulative Grade Points Average</th>
<th>Grade Description</th>
<th>Range of Marks*</th>
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<tr>
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<td>Outstanding</td>
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<tr>
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<td>RA</td>
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<td>Re-Appear</td>
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\[
\text{GP} = \frac{\text{Marks Obtained in course X Credit}}{100}
\]

\[
\text{GPA} = \frac{\text{Total Grade Points earned in a Semester}}{\text{Total Credits registered in a Semester}}
\]

\[
\text{CGPA} = \frac{\text{Sum of Grade Points Earned}}{\text{Total Credits registered in a Semester}}
\]

**CLASSIFICATION**

- CGPA 9 and above: I Class with Distinction
- CGPA between 7 and 8.9: I Class
- CGPA between 5 and 6.9: II Class

**Note:**

The above classification shall be given for overall performance including Non – Major Electives and Skill based Courses. i.e., For Performance in the Part III only.

**9. MAXIMUM DURATION FOR THE COMPLETION OF UG PROGRAM:**

The maximum duration for the completion of UG Program shall not exceed twelve semesters.

**10. COMMENCEMENT OF THIS REGULATION:**

These regulations shall take effect from the academic year 2017 - 2018 and thereafter.

**11. TRANSITORY PROVISION:**

Candidates who were admitted to the UG course of study before 2017 - 2018 shall be permitted to appear for the examinations under those regulations for a period for three years i.e. up to and inclusive of the examination of April/May 2020. Thereafter they will be permitted to appear only under regulations then in force.
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<tr>
<th>SUBJECT PAPER</th>
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<tr>
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</tbody>
</table>
UNIT I:

**Projectile:**
Definition of Range, time of flight and angle of projection – Range up and down an inclined plane maximum range – two directions of projections for a given velocity and range.

**Impulse–Impact:**

UNIT II

**Simple Harmonic Motion:**
Composition of two SHM's of same period along a straight line and at the right angles to each other – Lissajou's figures.

**Dynamics of Rigid Bodies:**
Moment of inertia–kinetic energy of a body rotating about a fixed axis–angular momentum of a rotating body–relation between torque and angular acceleration of a rigid body

Compound pendulum theory – interchangeability of center of suspension and center of oscillation – condition for minimum period – determination of g using compound pendulum – Bifilar pendulum – parallel threads

UNIT III

**Center of gravity**
Center of gravity of a solid cone, Solid hemisphere, hollow hemisphere and a tetrahedron

**Friction:**
Laws of friction – angle of friction – resultant reaction and cone of fiction – equilibrium of a body on an inclined plane under the action of a force

UNIT IV
Center of pressure:
Definition – center of pressure of a rectangular lamina and triangular lamina.

Hydrodynamics:
Equation of continuity of flow – Bernoullie's theorem – venturimeter – Pitot's tube

UNIT V
Classical Mechanics:
Mechanics of system of particles – conservation theorem for linear momentum, angular momentum and energy – constraints and its classification


BOOKS FOR STUDY:

BOOKS FOR REFERENCE:
B.SC. PHYSICS
SEMESTER – II
CORE II - THERMAL PHYSICS

UNIT I
Thermometry and Calorimetry:

UNIT II
Low temperature physics:

Practical applications of low temperatures:
Applications in pure science – applications in industry – Refrigeration – principle – Carnot's cycle as refrigerator – refrigerant – Air conditioning – air conditioner

UNIT III
Thermodynamics:

UNIT IV
Conduction and Radiation:
UNIT V

Maxwell's Thermodynamic relations:


BOOKS FOR STUDY:


BOOKS FOR REFERENCE:

B.SC. PHYSICS
SEMESTER – II
PHYSICS PRACTICAL - I

List of experiments
(Any Sixteen Only)

1. Young's Modulus (q) – Non uniform Bending – pin and microscope method.
2. Young's Modulus (q) – Non uniform bending – scale and telescope method.
4. Surface tension and interfacial surface tension – Drop Weight method.
5. Compound pendulum – Determination of g and k.
7. Viscosity of a liquid by graduated burette and mercury pellet method.
8. Spectrometer – (i–d curve).
11. P.O. Box – Temperature coefficient of resistance.
15. Construction of basic logic gates (AND, OR, NOT) using ICs and verification of truth tables.
16. Construction of special logic gates (NAND, NOR, EX–OR) using ICs and verification of truth tables.
17. Low range power pack using two diodes.
20. Forward bias and reverse bias characteristics of zener diode.

REFERENCE BOOKS:
1. Ouseph, Srinivasan & Vijayendran, Practical Physics
2. P. R. Sasi Kumar, Practical Physics –, PHI.
3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.
B.SC. PHYSICS

SEMESTER – III

CORE III - PROPERTIES OF MATTER AND SOUND

UNIT I:

Elasticity:

Three types of elastic moduli – Poisson's ratio – Bending of beams– Expression for bending moment –Cantilever–Depression of the loaded end of a Cantilever

Expression for Young's modulus (uniform and non–uniform bending) – experimental determination of Young's modulus using pin and microscope method (uniform and non–uniform bending) – Determination of Young's modulus by Koenig's method for non–uniform bending

Torsion of a body – expression for couple per unit twist – determination of rigidity modulus – Static torsion method with scale and telescope – determination of rigidity modulus by torsion pendulum with mass

UNIT II:

Viscosity:

Definition of Coefficient of viscosity with unit and dimension – expression for critical velocity–Poiseulli's formula for coefficient of viscosity and its correction – determination of coefficient of viscosity by capillary flow method (Poiseulli's method) – comparison of viscosities by Oswald's viscometer – viscosity of a highly viscous liquid –Stoke's formula–Stoke's method for the Coefficient of a highly viscous liquid

Diffusion:


UNIT III:

Surface tension:

Definition of surface tension with unit and dimension– Surface energy – formation of drops– angle of contact – excess of pressure inside curved surface – Experimental determination of surface tension (Jaegar's method) – drop weight method of determining surface tension and interfacial surface tension –Quincke's method

UNIT IV

Sound:

UNIT V

Ultrasonics:

BOOKS FOR STUDY:

BOOKS FOR REFERENCE:
UNIT – I

Interference and Interferometers:


UNIT - II

DIFFRACTION AND OPTICAL INSTRUMENTS


UNIT - III

Polarization:


UNIT - IV

Aberrations:

UNIT-V

Fibre Optics:

Introduction – fiber optic system – the fiber optic communication compared to metallic cable (electrical) communication – basic principle – total internal reflection – acceptance angle and numerical aperture – types of optical fibers based on material – propagation (transmission) of light through an optical fiber – index profile – fiber configurations – difference between single mode fiber and multimode fiber – difference between step index fiber and graded index fiber – fiber optic communication link.

BOOKS FOR STUDY:


BOOKS FOR REFERENCE:

LIST OF EXPERIMENTS (ANY SIXTEEN ONLY)

01. Young's modulus (q) – uniform bending – pin and microscope.
02. Young's modulus (q) – uniform bending – scale and telescope method.
03. Static Torsion – Rigidity modulus.
04. Torsion Pendulum – Moment of Inertia and Rigidity modulus – symmetrical masses.
05. Surface tension of a liquid – capillary rise method.
06. Sonometer – relative density of solid and liquid
07. Specific heat capacity of a liquid by cooling – verification of Newton's law of cooling.
08. Air Wedge – thickness of a wire and its insulation.
11. Potentiometer – Specific resistance of the given coil and length of second coil without unwinding.
13. Field along the axis of a coil – deflection magnetometer – determination of BH.
15. BG – Comparison of Capacities.
16. BG – Comparison of EMF’s of two cells.
17. Zener diode – Voltage regulator using four diodes and percentage of regulation.
18. Verification of De Morgan's theorem.
19. Bridge rectifier
20. NAND and NOR gates as universal building block (Construction of AND, OR & NOT)

REFERENCE BOOKS
1. Ouseph, Srinivasan & Vijayendran, Practical Physics
2. P. R. Sasi Kumar, Practical Physics –, PHI.
3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.
B.SC. PHYSICS

SEMESTER – V

CORE - V ELECTRICITY AND MAGNETISM

UNIT I


UNIT II

Carey–Foster Bridge – theory – temperature coefficient of resistance – potentiometer – calibration of ammeter and high range voltmeter – thermoelectricity – laws of thermo e.m.f., intermediate metals, intermediate temperature – measurement of thermo e.m.f. using potentiometer–Peltier effect and Peltier coefficient – Thomson effect and Thomson coefficient – relation between π and σ – thermo electric diagrams and its uses.

UNIT III


UNIT IV

Transient current – growth and decay of current in a circuit containing resistance and inductance – growth and decay of charge in a circuit containing resistance and capacitance – measurement of high resistance by leakage – growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

UNIT V

B.Sc. PHYSICS

BOOKS FOR STUDY:

1. Brijlal and Subramaniam, Electricity and Magnetism, S. Chand & Co, New Delhi (2016)
2. R. Murugeshan, Electricity and Magnetism, S. Chand & Co, New Delhi (2016)

BOOKS FOR REFERENCE:

UNIT I


UNIT – II

Transistor circuits: Transistor CB, CE, CC configurations-Common emitter transistor as an amplifier - DC and AC load line analysis - Transistor biasing - stabilization - base resistor method-feedback resistor method - Voltage divider bias method.

UNIT – III


UNIT – IV

Multistage transistor amplifier – definition of gain, frequency response, decibel gain and bandwidth – frequency response, advantages, disadvantages and applications of RC coupled two stage transistor amplifier and transformer coupled two stage amplifier.

Principle of feedback in amplifiers – positive and negative feedback – effect of negative feedback - emitter follower – positive feedback amplifier as an oscillator – Colpitt's oscillator, Hartley oscillator and Piezoelectric crystal oscillator.

UNIT – V

B.Sc. PHYSICS

BOOKS FOR STUDY:
1. B.L. Theraja, Basic Electronics (Solid state), S. Chand & Co. (2006)

BOOKS FOR REFERENCE:
B.SC. PHYSICS
SEMESTER – V
CORE VII - ATOMIC PHYSICS

UNIT – I


UNIT – II


UNIT – III


UNIT – IV


UNIT – V

B.Sc. PHYSICS

BOOKS FOR STUDY:

3. N. Subramaniyam, Brijlal and Jivan Seshan, Atomic and Nuclear Physics, S. Chand & Co, New Delhi, (2013)

BOOKS FOR REFERENCE:

3. Henry Semat, John R. Albright, Introduction to Atomic and Nuclear Physics, Fletcher & Son Ltd, Norwich; (1972)
4. T.A. Littlefield, N. Thorley, Atomic and Nuclear Physics, Medtec, New Delhi (2013)
5. B.N. Srivatsava, Basic Nuclear Physics and Cosmic rays, Pragti Prakashan publishers, Meerut (2011)
UNIT –I:

NUCLEAR STRUCTURE


UNIT –II:

NUCLEAR DETECTORS


UNIT –III:

ARTIFICIAL TRANSMUTATION


UNIT –IV:

RADIOACTIVITY


UNIT –V:

ELEMENTARY PARTICLES:

B.Sc. PHYSICS

BOOKS FOR STUDY:
3. N. Subramaniyam, Brijlal and Jivan Seshan, Atomic and Nuclear Physics, S. Chand & Co, New Delhi, (2013)

BOOKS FOR REFERENCE:
3. Henry Semat, John R. Albright, Introduction to Atomic and Nuclear Physics, Fletcher & Son Ltd, Norwich; (1972)
4. T.A. Littlefield, N. Thorley, Atomic and Nuclear Physics, Medtec, New Delhi (2013)
5. B.N. Srivatsava, Basic Nuclear Physics and Cosmic rays, Pragti Prakashan publishers, Meerut (2011)
UNIT I:

**WAVE MECHANICS I**


UNIT II:

**WAVE MECHANICS II**


Basic postulates of wave mechanics –eigen value and eigen function–operator formalism – linear operators –self–adjoint operators – expectation values (position and momentum) –

UNIT III:

**SCHRODINGER'S WAVE EQUATION IN ONEDIMENSION**

Schrödinger's wave equation for time dependent and time independent forms –Schrodinger's equation for free particle – physical significance and properties of wave function –Normalized and orthogonal wave function–Particle in a box–Tunneling effect–Barrier penetration problem – Linear harmonic oscillator–zero point energy

UNIT IV:

**SCHRODINGER'S WAVE EQUATION IN THREEDIMENSION**

UNIT V:

RELATIVITY


BOOKS FOR STUDY:


BOOKS FOR REFERENCE:

B.SC. PHYSICS

SEMESTER – VI

PHYSICS PRACTICAL - III

List of experiments (Any Sixteen Only)

01. Cantilever - Young's modulus (q) - mirror and Telescope.
02. Coefficient of viscosity - ungraduated burette - radius by mercury pellet.
03. Newton's rings - refractive index of a lens.
04. Spectrometer - i - i' curve.
05. Spectrometer - small angled prism.
06. Potentiometer - calibration of high range voltmeter.
07. Comparison of two low resistances by a potentiometer.
08. Deflection magnetometer - m and BH - Tan C position.
09. Determination of thermo e.m.f - direct method – spot galvanometer.
10. Copper Voltmeter-M and B_H.
11. B.G. - Charge Sensitivity.
12. B.G. - Determination of absolute capacity.
14. FET – Characteristics.
15. UJT – Characteristics.
16. SCR – Characteristics.
17. Hartley Oscillator.
18. Colpitt's Oscillator.
20. Microprocessor 8085 – Multiplication and Division.

BOOKS FOR STUDY & REFERENCE

1. Ouseph, Srinivasan & Vijayendran, Practical Physics
2. P. R. Sasi Kumar, Practical Physics –, PHI.
3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.
B.SC. PHYSICS

SEMESTER – VI

PHYSICS PRACTICAL - IV

List of experiments (Any Sixteen Only)

01. Koenig's method - non - uniform bending.
02. Koenig's method - uniform bending.
03. Bifilar pendulum - Parallel threads.
04. Spectrometer - dispersive power of a grating.
05. Spectrometer - Cauchy's constant.
06. Potentiometer - EMF of a thermocouple.
07. Field along the axis of a coil - vibration magnetometer.
08. Carey Foster's bridge - temperature coefficient of resistance
09. Astable multivibrator using 555 timer
10. Monostable multivibrator using 555 timer
11. RS - flip flops using NAND and NOR gates.
12. RC coupled amplifier - single stage.
15. Operational amplifier-Adder and Subtractor.
16. Operational amplifier - Integrator and Differentiator.
17. V-I Characteristics of LED.
18. BCD to Seven segment display.
20. Half subtractor and Full subtractor.

REFERENCE BOOKS:
1. Ouseph, Srinivasan & Vijayendran, Practical Physics
2. P. R. Sasi Kumar, Practical Physics –, PHI.
3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.
B.SC. PHYSICS

SEMESTER – V

ELECTIVE I - MATHEMATICAL PHYSICS & NUMERICAL METHODS

UNIT I: MATRICES

Solution of linear equation – Cramer's rule – characteristics matrix and characteristics equation of a matrix – eigen values and eigenvectors – sub space and null space Diagonalisation of 3 x 3 symmetric matrices

UNIT II: BETA AND GAMMA FUNCTIONS

Fundamental properties of gamma functions – the value and graph of gamma function – transformation of gamma function – different forms of beta function – relation between beta and gamma function – application

UNIT III: CURVE FITTING

Principle of least square – fitting a straight line – linear regression – fitting a parabola - fitting an exponential curve

UNIT IV: ITERATIVE METHODS


UNIT V: NUMERICAL INTEGRATION

General formula – Trapezoidal rule – Simpson's - 1/3 rd rule and 3/8th rule – Gaussian quadrature formula

BOOKS FOR STUDY:

B.Sc. PHYSICS

B.SC. PHYSICS
SEMESTER – V

ELECTIVE II - SOLID STATE PHYSICS

UNIT I : CRYSTAL STRUCTURE
Crystal lattice - primitive and unit cell – crystal systems – Bravais lattice - Miller indices – Structure of Crystal - Simple Cubic, Body Centered Cubic, Face Centered Cubic and Hexagonal Close Packed structure, Sodium chloride structure, Zinc blende structure and Diamond structure.

UNIT II : CRYSTALLOGRAPHY AND CRYSTAL IMPERFECTIONS
X ray Spectrum - Moseley's law - diffraction of X-rays by crystals - Bragg's law in one dimension - Experimental method in X-ray diffraction – Laue's method, rotating crystal method – powder photograph method - point defects – line, surface and volume defects- effects of crystal imperfections.

UNIT III : MAGNETIC PROPERTIES

UNIT IV : DIELECTRIC PROPERTIES
Fundamental definition in dielectrics - different types of electric polarization - frequency and temperature effects on polarization -dielectric loss - Clausius - Mosotti relation - determination of dielectric constant - dielectric breakdown - properties of different types of insulating materials.

UNIT - V: MODERN ENGINEERING MATERIALS

BOOKS FOR STUDY:
3. G. Vijayakumari, Engineering Physics, Vikas Publications

BOOKS FOR REFERENCE:
B.SC. PHYSICS  
SEMESTER – V  
ELECTIVE III - APPLIED PHYSICS

UNIT I  
Crystal Growth  

UNIT II  
Nanomaterials  
Synthesis and classification of synthesis methods – techniques used in synthesis of nano materials – Chemical vapour Deposition, Sol-gel technique, Electro Deposition method, Ball Milling method – Properties of nano materials and applications

UNIT III  
Vacuum Technology  
Vacuum - Importance of Vacuum technology in Industry – unit of vacuum – pressure range for low vacuum to ultra-high vacuum  
Pumps: Cenco-havoc rotating oil pump, Mercury diffusion pump and Turbo molecular pump.  
Gauges: Pirani gauge, Penning gauge and Mc Lead gauge

UNIT IV  
Spectroscopy  

UNIT V  
Bio Physics  
Basis of bio molecules and molecular system-Membrane biophysics - nerve cell - bio physical basis of nerve impulse conduction – membrane potential – resting potential and action potential - Gross bioelectrical phenomenon of ECG and EEG-Molecular basis of muscle contraction, ultra structure and molecular basis of vision and hearing
B.Sc. PHYSICS

BOOKS FOR STUDY:
2. T. Pradeep, NANO: The Essentials, McGraw-Hill Education
3. G. Vijayakumari, Engineering Physics, Vikas publications.
5. M. V. Volkenshtein, Biophysics, Mir Publications.
7. Straughan and Walker, Spectroscopy — Vol. I, II and III,
8. V.V. Rao etal, Vacuum Science and Technology, Allied Publishers Ltd.
B.SC. PHYSICS

SEMESTER – V

ELECTIVE IV - ENERGY PHYSICS

UNIT I : SOLAR ENERGY


UNIT II : WIND ENERGY

Basic principles of wind energy conversion - wind data and energy estimation - basic components of a Wind Energy Conversion System(WECS) - generator control - local control - application of wind energy- energy from tides

UNIT III : BIO-MASS ENERGY


UNIT IV : ENERGY STORAGE

Lead acid battery - Nickel cadmium battery - high temperature battery- Sodium sulphur cell - advantages of Batteries - Hydrogen storage.

UNIT V : ENERGY CONSERVATION

Principles of energy conservation - types of energy audit – energy conservation approach technologies - co-generation - gas turbines and diesel engine - heat pipes - principle - classification of heat pipes

BOOKS FOR STUDY :

UNIT I: ATOMIC SPECTROCOPY
Constant deviation spectrometer – Hartmann's formula – fine structure and super fine structure – Solar Spectrum – high resolution Spectroscopy – L. G. plate – Fabry – Perot etalon application

UNIT II: MOLECULAR SPECTROCOPY

UNIT III: LASER PHYSICS

UNIT IV: INFRARED SPECTROSCOPY

UNIT V: RAMAN SPECTROSCOPY
Raman effect – classical and quantum theory – molecular polarizability – pure rotational Raman spectra of linear molecules – vibrational Raman spectra – structure determination - vibrational spectroscopy-techniques and instrumentation

BOOKS FOR STUDY AND REFERENCE:
6. Gurdeep R. Chatwal, Spectroscopy (Atomic and Molecular), Himalaya Publishing House,
B.SC. PHYSICS
SEMESTER – V I
ELECTIVE VI - ELECTRONIC COMMUNICATION

UNIT – I
Modulation
definition - types of modulation AM, FM, PM – expression for amplitude modulated voltage - wave form of amplitude modulated wave - collector modulation circuit - single side band generation - balanced modulator - AM transmitter - block diagram and explanation - frequency modulation - expression for frequency modulated voltage - side bands in FM, AM production by transistor modulator - comparison of AM, FM, PM.

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.

UNIT – III
Television

UNIT - IV
RADAR and Satellites
principle of radar - Radar equation - radar – transmitting systems - radar antennas - duplexer - radar receivers uses of radar – introduction to Satellite communication system – Basic components – Telemetry – and command system (Block diagram) – Satellite links

UNIT - V
Digital communication
Digital technology - fundamentals of data communication systems - characteristics of data transmission circuits – digital codes - error detection and correction - data sets and interconnection - requirements - modern classification – modern interfacing

BOOKS FOR STUDY:
2. Kennedy and Davis , Electronics Communication Systems, TMH
UNIT I: Universe


UNIT II: Comets, Meteors, Asteroids

Composition and structure of comets - periodic comets – salient features of asteroids, meteors and its use

UNIT III : Sun

Structure of photosphere, chromosphere, corona - sunspots – solar flares - solar prominences - solar piages - satellites of planets-structure, phases and their features of moon.

UNIT IV : Stars

Constellations - binary stars - their origin and types star clusters - globular clusters - types of variable stars - types of galaxies.

UNIT V : Origin of Universe

Big bang theory - pulsating theory - steady state theory – composition of universe expansion

REFERENCE:

3. Prof. P. Devadas, The fascinating Astronomy, Devadas Telescopes, Chennai
4. R.P. Singhal, Elements of Space Physics, PHI, (2009)
UNIT - I
Evolution of computers - computer generations - history of development of computers

UNIT - II
Input unit - output unit - Central Processing Unit (CPU) –programming languages - algorithms - flow charts - operating system -basic principle

UNIT - III
Basic structure of C - programs - constants - variables - data type –declaration of variables - defining symbolic constants, operators and expression - reading a character - writing a character – formatted input and output statements

UNIT - IV
Control statements - simple if, if – else, else - if ladder – switching statements - go to statement - break and continue looping - while-do for statements - arrays - user defined functions - string functions -strcmp, strcpy, strlen, strcmp - elementary idea.

UNIT - V
Development of algorithm, flow chart and program for the following
1. Average of a set of numbers
2. Area of a triangle
3. Sorting a set of numbers in ascending and descending order
4. Summing the series of numbers
5. Solving the series of numbers.

BOOKS STUDY AND REFERENCE
3. Henry Mullish (Author), Herbert L. Cooper (Author), The Spirit of C (1998)
UNIT I:

UNIT II:
Electro - Cardiography (ECG) - Electromyography (EMG) - Electro -Encephelograph (EEG) - Phonocardiography

UNIT III:
Pacemakers - introduction - external and internal pacemakers -artificial heart valves - (principle - block diagram and operation)

UNIT IV:

UNIT V:
Radiation safety instrumentation - effects of radiation exposure –radiation monitoring instruments - pocket dosimeter - pocket typeradiation alarm

BOOKS FOR STUDY & REFERENCE
B.SC. PHYSICS
SEMESTER – V
SKILL BASED ELECTIVE COURSE - IV
DIGITAL ELECTRONICS

UNIT I
Number system and codes

UNIT II
Boolean algebra

UNIT III
Arithmetic and logic circuits

UNIT IV
Sequential circuits

UNIT V
Counters and data converters

BOOKS FOR STUDY
UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V


BOOKS FOR STUDY AND REFERENCES

1. P. L. Soni, P.V. Gupta and V.S. Bhatnagar, A text book in electric power, Dhanpat rai sons,
2. E.O. Taylor, Utilization of electrical energy, Orient Longman
6. Alternating current electrical engineering, Philip Kemp, Mcmillan (1963)
B.SC. PHYSICS  
SEMESTER – VI  
SKILL BASED ELECTIVE COURSE - VI  
MICROPROCESSOR AND ITS APPLICATIONS

UNIT- I
Terms related to microprocessor (microprocessor, micro computer, Bit, Byte, MSB, LSB, Nibble, Word, Instruction, Bus, Mnemonic, Program, Machine language, Assembly language) - Functional block diagram of micro computer - Development of microprocessor – Pin configuration of microprocessor of 8085 – power supply - address bus – Multiplexed address/data bus – control and status signals- interrupt signals –clock signals- hand shake signals – reset signals

UNIT-II

UNIT-III
Addressing modes of 8085- Instruction set of 8085 – Classification of instruction set based on their operations with examples – Data transfer operations – Arithmetic operations – Logical operations – Branching operations – Machine control operations

UNIT-IV
Assembly language programs: Transferring a block of data – 8 bit addition - 8 bit subtraction - 8 bit multiplication – 8 bit division –Square root of a number

UNIT-V
Assembly language programs: Arranging numbers in ascending and descending order (Bubble sort method) – Finding greatest and smallest number in an array – Sum of N numbers – Generating Fibonacci series

BOOKS FOR STUDY AND REFERENCE
UNIT I:
Electrification by friction - two kinds of electricity - capacitor - principle of condenser - types of condensers - fixed condenser - variable condenser.

UNIT II:
Condenser boxes - electrolytic condenser - guard ring - condenser - condenser in series - condensers in parallel.

UNIT III:
Electric field - potential - Ohm's law - electrical energy and power - resistance - types of resistance - fixed resistance - variable resistance.

UNIT IV:

UNIT V:
Primary cell - Daniel, Leclanche, Dry cell - Secondary cell - Lead acid, Nickel (Principle only) - Cadmium cell - rechargeable cell.

BOOKS FOR STUDY
1. Brijlal and Subramaniam, Electricity and Magnetism, S. Chand & Co, New Delhi (2016)
2. R. Murugeshan, Electricity and Magnetism, S. Chand & Co, New Delhi (2016)

BOOKS FOR AND REFERENCE
B.SC. PHYSICS
SEMESTER – IV
NON MAJOR ELECTIVE COURSE - II
PHYSICS IN EVERYDAY LIFE

UNIT I: MECHANICS
Motion, Force and Newton's laws - momentum - projectile and circular motions - gravitation - planetary motion and earth satellites – communication satellites - work, power and energy - energy and environment – rotational motion

UNIT II: PROPERTIES OF MATTER
Three states of matter - binding forces - fluid pressure and thrust - applications - Pascal law - Archimedes principle – capillary action - Bernoulli's principle - Viscosity

UNIT III: HEAT AND SOUND

UNIT IV: ELECTRICITY AND MAGNETISM

UNIT V: OPTICS
Light - optical instruments - camera - telescope - microscope - projector - nuclear energy - fission and fusion - nuclear power plants - atom bomb and hydrogen bomb

BOOKS FOR STUDY
5. R. Murugesan, Electricity, S. Chand & Co, New Delhi (2010)
UNIT I: Properties of matter:

Elasticity–Bending of beams – Expression for bending moment –Expression for Young's modulus (uniform and non–uniform bending) – experimental determination of Young's modulus using pin and microscope method (uniform and non–uniform bending) –Torsion of a body – expression for couple per unit twist – determination of rigidity modulus of a wire by torsional pendulum– Static torsion method with scale and telescope – drop weight method of determining surface tension and interfacial surface tension

UNIT II SOUND:

Laws of transverse vibrations of strings–Sonometer – verification of laws of transverse vibrations of strings–determination of AC frequency

Ultrasonics:


UNIT III Heat:


UNIT IV Gravitation:

Newton's law of gravitation – inertial mass– gravitational mass–Kepler's laws of planetary motion–deduction of newton's law of gravitation from Kepler's laws–determination of G by Boy's experiment–variation of g with altitude– variation of g with depth

UNIT V Electricity:

BOOKS FOR STUDY AND REFERENCE

5. R. Murugesan, Electricity, S. Chand & Co, New Delhi (2010)
UNIT I:

Atomic physics:


UNIT II

Nuclear Physics:


UNIT III

Solid state physics:


Simple crystal structures – simple cube – body centered cube – face centered cube – co-ordination number – atomic radius – packing factor

UNIT IV

Semiconductor physics:

Theory of energy bands in crystals – distinction between conductors, insulators and semiconductors – intrinsic and extrinsic semiconductors – zener diode characteristics – break down voltage – zener diode as voltage regulator

Basic logic gates – OR, AND, NOT, NAND, NOR, XOR gates – NAND & NOR as universal building block –De Morgan's theorem and its verification - laws of Boolean algebra – simplification of Boolean expressions
UNIT V

LASERS and MASERS:


BOOKS FOR STUDY AND REFERENCE

List of experiments (Any Sixteen Only)

01. Young's modulus (q) – non-uniform bending – scale and telescope method.
02. Young's modulus (q) – uniform bending – scale and telescope method.
03. Static Torsion – Rigidity modulus of a rod
04. Torsion Pendulum – Rigidity modulus of a wire.
05. Surface tension and interfacial surface tension of a liquid – drop weight method.
06. Sonometer – frequency of a tuning fork
07. Sonometer – AC frequency
08. Air Wedge – thickness of a wire.
09. Newton's rings – determination of wavelength of light
10. Spectrometer – Refractive index of a solid prism.
12. Determination of viscosity using graduated burette
13. Specific heat capacity of a liquid – half time correction.
15. Potentiometer – calibration of low range voltmeter.
17. Characteristics of zener diode.
18. Verification of truth tables of AND, OR & NOT gates using ICs.
19. Construction of low range power pack using two diodes.
20. Verification of De Morgan's theorems