1. **Objective:**
   The Syllabus for B.Sc. Physics degree under Non-semester system has been designed on the basis which would focus on job oriented programmes. It will effect from the academic year 2013-2014.

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

3. **Duration of the course:**
   The students who are joining the B.Sc., (Physics) degree shall undergo a study period of three academic years.

4. **Subjects of study and scheme of examination:**
   The subjects offered in major physics for three years and the schemes of examination are given.

5. **Question Paper Pattern:**
   Total mark in each paper is 100

**Exam Pattern**

The pattern of Question paper will be as follows:

**Time: 3 Hours**  
**Max. Marks: 100**

**Section A: (10x3 = 30 marks)**

**Short Answers**

1. At least two questions from each unit
2. Maximum 12 questions in this section
3. Answer any 10 out of 12 questions

**Section B: (5x6 = 30 marks)**

1. Answer 5 questions choosing out of 8 questions
2. Answer not exceeding two pages.
3. At least one question from each unit
4. At least one problem from any unit

Section C: (4x10 = 40 marks)
1. Answer not exceeding four pages.
2. Answer any four out of six questions
3. At least one question from each unit
4. There must be at least one problem from any unit

Blue Print of the Question Paper – Core Subjects

<table>
<thead>
<tr>
<th>Section</th>
<th>Types of Questions</th>
<th>No. Of Questions</th>
<th>No. Of Questions to be answered</th>
<th>Marks for each question</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Short Answers at least Two questions from each unit</td>
<td>12</td>
<td>10</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>B</td>
<td>Not exceeding 2 pages at least One from each unit*</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>C</td>
<td>Not exceeding 4 pages (any four out of six) at least one from each unit</td>
<td>6</td>
<td>4</td>
<td>10</td>
<td>40</td>
</tr>
</tbody>
</table>

*There must be at least one problem in Section B and Section C. There will be Two Allied subjects to fulfill the course during three years.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Year of Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>I &amp; II</td>
</tr>
<tr>
<td>Applied Electronics</td>
<td>II &amp; III</td>
</tr>
</tbody>
</table>

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

- Practical:
  Record Note Book / = 25
  Examination external = 75

-----------

306
5. Eligibility for the degree:
   i. A candidate will be eligible for the B.Sc., degree by completing three years and passing all the prescribed examinations.
   ii. A candidate shall be declared as passed the course, if she / he scored a minimum of 35% marks in each paper of all the subjects.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>LANGUAGE</th>
<th>MAJOR</th>
<th>ANCILLARY I</th>
<th>ANCILLARY II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>English - I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>English – II</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Unit – I


Unit – II

Uniform circular motion – The dynamics of uniform circular motion – Moment of inertia of circular disc about an axis passing through its center and perpendicular to its plane, through its diameter, through its tangent – Moment of inertia of a solid sphere about all axes- Angular momentum and angular velocity and torque – Relation between angular momentum and torque – Kinetic energy of rotation and the work energy theorem – Conservation of angular momentum – Work done by constant force – work done by variable force – work and kinetic energy in rotational motion – Expression for the acceleration of a body rolling down an inclined plane.

Unit – III


Unit – IV


Unit – V

determination of surface tension by capillary rise – Pitot tube and Venturi meter – Bernoullie’s theorem.

**Text Books:**


**Paper – II Heat, thermodynamics & statistical mechanics**

**Unit I**

**Unit II**

**Unit III**

**Unit IV**

**Unit V**

Text Book


Reference Book

1. Thermal Physics - R.Murugesan, S. chand & Co

Paper – III - Electricity and Electromagnetism

Unit – I

Coulomb’s law – Gauss law – Its proof and applications – Electric field due to a charged sphere – Electric field due to a plain sheet of charged conductor – Coulomb’s theorem – Mechanical force on the surface of the charged conductor – Electric field, Electric potential, Relation between them - Electric field due to electric dipole, on the axial line and equatorial line – Potential due to a charged conductor – Capacitance – Principle – Expressions for the capacitance – Spherical capacitor – Cylindrical capacitor – Parallel plate capacitor with and without the dielectric – Energy of capacitor – Loss of energy due to sharing of charges – Types of capacitors, fixed capacitor, variable capacitor, Electrolytic capacitor and sliding capacitor.

Unit – II


Unit – III


Unit – IV

Unit – V


Text Books:

OPTICS AND SPECTROSCOPY

UNIT I:


UNIT II:

Interference: Introduction—theory of interference fringes—Fresnel’s biprism—determination of thickness of thin transparent film by biprism arrangement—interference in thin films—colors of thin films—air wedge, determination of the diameter of a thin wire by air wedge. Test for optical flatness—Newton’s rings—determination of \( \lambda \) and \( \mu \), of liquid, Newton’s ring due to two curved surface—interferometer—Michelson’s interferometers, determination \( \lambda \) and \( d\lambda \)—uses. Jamin’s Rayleigh’s interferometer.

UNIT III


UNIT IV


UNIT V

Spectroscopy: classification as line, banded continues spectra—spectrum—fraunhofer lines. Infrared spectroscopy—applications—scattering of light—Raman effect, experimental setup, characteristic of Raman lines—molecular structure. Basic concept of resonance spectroscopy—nuclear magnetic resonance—nuclear quadruple resonance—Mossbauer spectroscopy—electron spin resonance: Experimental setup and any one of the applications—(qualitative treatment)—Laser—ruby laser, He–Ne gas laser, construction and working—application of laser. Fiber optic
Paper – IV - Atomic and Nuclear physics

Unit I

Unit II

Unit III

Unit IV

Unit V

Reference Book
2. Perspective of Modern Physics-Arther Beiser

Book for study
1. Modern Physics- R.Murugesan, S. chand & Co
CLASSICAL AND QUANTUM MECHANICS

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V

Books for Study:


Paper – VII - Computer Programming in C and C++


Unit III Introduction to C++: Data types, Operators and Statements - Basic concepts – character set – identifiers and key words – Constants – operators – variables – expressions – statements Switching, Loop and Breaking statements. Simple programs.


Text Books:

Reference Books:

1. Programming with C by Schaum Series

Paper – VIII - Analog and Digital Electronics


Unit III Digital Electronics: Number Systems – Conversion from one another – Binary Arithmetics – one’s and two’s complements – BCD code – Boolean algebra – De Morgan’s theorems – Karnaugh Map – 2,3, and 4 variable – simplification. Logic gates – Or, AND, NOT, NOR, NAND and X-OR gates – Logic families - Diode Resistor Logic (OR, AND gates), RTL(NOT gate), DTL and TTL(NOR and NAND).


Text Books:
2. Basic Electronics by B.L.Theraja, S. Chand &Co.

Reference Books:


Paper – IX - Materials and Nano Science


Text books


Reference books


I B.Sc. Physics

Practical-I

(Any Twelve)

1. Young’s Modulus Uniform bending-Pin and Microscope Method.
2. Young’s Modulus Non uniform bending-Optic lever Method (Telescope).
3. Compound Pendulum-Determination of ‘g’.
4. Torsional Pendulum-Determination of Rigidity Modulus.
5. Spectrometer-Dispersive power of prism (Mercury lamp).
6. Potentiometer-Low range voltmeter calibration.
7. Meid’e’s String.
8. Young’s Modulus Uniform bending-Optic lever method (Telescope).
9. Young’s Modulus Non uniform bending-Pin and Microscope method.
12. Potentiometer-Calibration of Ammeter
14. Spectrometer-μ of the small angle prism.
15. Viscosity – Stoke’s method.
II B.Sc. Physics
Practical-II
(Any Twelve)

1. Sonometer-Frequency of AC.
2. Newton’s Ring-Sodium lamp (Microscope).
3. spectrometer-i-d curve
4. Carey Foster Bridge.
5. B.G Comparison of Capacitance.
6. B.G Charge Sensitiveness.
7. Copper Voltameter.
8. Comparison of Capacitance –De Sauty’s Bridge
9. Airwedge
10. Spectrometer-i i’ curve using prism.
11. Bi-Prism.
12. B.G- Comparison of E.m.f s.
14. Spectrometer-Grating by minimum Deviation
15. Magnetic field along the axis of a coil carrying a current.

III – B.Sc. (Physics)

Practical-III
(Any Twelve)

1. Hartmann’s constant
2. LCR Series Resonance Circuit
3. Cauchy’s Constants.
4. Comparison of Mutual Inductance
5. LCR Parallel Resonance Circuit
7. Owen’s Bridge.
10. $\mu p – 8$ bit Addition and Subtraction.
11. $\mu p$-Multiply two 8-bit numbers using repeated addition.
12. $\mu p$-Find the largest of given N- Number.
13. $\mu P$-To arrange the data array in Ascending order.
15. Maxwell’s Bridge.
16. EMF of a thermocouple using Potentiometer
III – B.Sc. (Physics)

Practical- IV

(Any Twelve)

1. Transistor Characteristics – CE mode.
2. Colpitt’s Oscillator.
5. Hartley Oscillator.
6. Zener diode characteristics.
7. Integrator and Differentiator using IC-741.
8. Logic gates using IC-(AND,OR,NOT).
9. Single stage amplifier.
10. Operation amplifier characteristics.
11. Double stage amplifier without Feedback.
12. Universal building block-NAND and NOR gates.
13. Logic gates using discrete components (AND, OR, NOT).
15. Operational amplifier-Addition, Subtraction.

ANCILLARY ANALOG ELECTRONICS – I


Unit II Field Effect Transistors and SCR: Junction field effect transistor (JFET) – principle and working of JFET – Parameters of JFET – Advantages of JFET – Metal Oxide Semiconductor FET (MOSFET) – MOSFET biasing – Silicon Controlled Rectifier (SCR) – working of SCR – Applications of SCR.


**Reference Books:**

1. A text book of Electronics – J.B.Rajam
3. Analog and Digital Electronics – Ubald raj, Jose Robin.

**Ancillary Digital Electronics – II**

**Unit I Number systems:** Number systems – Binary number system – Decimal to binary and Binary to decimal conversion - Binary addition, subtraction, multiplication – Octal and Hexadecimal number systems.

**Unit II Logic Circuits:** - AND, OR, NOT gates – one’s and two’s complements – BCD code – Boolean algebra – De Morgan’s theorems. NAND and NOR gates – NAND and NOR as universal building block. Logic families - Diode Resistor Logic (OR, AND gates), RTL(NOT gate), DTL and TTL(NOR and NAND).


**Text Books:**


**Reference Books:**

1. Modern Digital Electronics by R P Jain TMH Publishing Company Ltd.
   Digital Electronics and Microprocessors by R P Jain TMH Publishing Company Ltd
II – B.Sc. (Physics)

Practical- I Ancillary Electronics

(Any Twelve)
1. Halfwave Rectifier.
2. Fullwave Rectifier.
4. Wave form analysis using CRO.
5. AC/DC current analyzing using CRO.
6. Flip-Flops-RS and JK.
7. De-Morgan’s theorem verification.
8. Op-Amp as low pass filter.
9. Clipping Circuits.
10. FET-Characteristic.
11. Transistor Charateristic CB mode.
12. Positive voltage Regulator using IC.
13. Negative voltage Regulator using IC.
15. High voltage Regulator using IC-273.
16. Inverting AC amplifier.

III – B.Sc. (Physics)

Practical- II Ancillary Electronics

(Any Twelve)
1. Non-Inverting AC amplifier.
2. Single stage amplifier with Feedback.
5. 1-16 De-Multiplexer.
6. 16-1 De-Multiplexer.
7. Monostable Multivibrator using Transistor.
10. Square wave generator using 555 timer.
11. Shift Register.
12. Dual Power supply.
13. Ring Counter.
15. Frequency measuring- Lissajou’s figure method.
16. AC/DC voltage measurement using CRO.
B.Sc. ANCILLARY PHYSICS (Non – Semester) SYLLABUS

1. Subjects of Study and Scheme of Examination:
The subjects offered in Ancillary Physics for two years (four semesters) and the scheme of examination are given.

2. Question Paper Pattern:
Total Mark in each paper is 100.

Section A: (10 x 3 = 30 Marks)
Short Answers:
1. At least one question from each Unit.
2. Maximum 12 questions in this section.
3. Answer any 10 out of 12 questions.

Section B: (5 x 6 = 30 Marks)
1. Answer any 5 questions choosing out of 8 questions.
2. Answer not exceeding two pages.
3. At least one problem from any one unit.

Section C: (4 x 10 = 40 Marks)
1. Answers not exceeding four pages.
2. Answer any four out of six.
3. At least one problem from any one unit.

There must be at least one problem in Section B and Section C.

Blue Print of the Question Paper:

<table>
<thead>
<tr>
<th>Section</th>
<th>Type of Questions</th>
<th>No. of Questions</th>
<th>No. of Questions to be Answered</th>
<th>Marks for each Question</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Short answers at least one problem from any one unit.</td>
<td>12</td>
<td>10</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>B</td>
<td>Not exceeding 2 pages one from each unit*</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>C</td>
<td>Not exceeding 4 pages</td>
<td>6</td>
<td>4</td>
<td>10</td>
<td>40</td>
</tr>
</tbody>
</table>

- There must be at least one problem each in Part B and Part C

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

<table>
<thead>
<tr>
<th>Section</th>
<th>Title of the Paper</th>
<th>Subject Code</th>
<th>Year of Study</th>
<th>Exam Hour</th>
<th>Max. Marks</th>
<th>Min. Marks for Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mechanics Properties of Matter, Sound and Thermal Physics</td>
<td>I / II</td>
<td>3 hrs</td>
<td>100</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Anc. Physics Practical I</td>
<td>I / II</td>
<td>3 hrs</td>
<td>100</td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>
Environmental Science is a Compulsory Paper for all Third Year Students.

Practical:
Every student should submit the practical record book at the time of practical examination. The maximum marks of 100 for the practical will be allotted as follows:

- Practical record Note: 25
- Practical Examination: 75

----------
100
----------

B.Sc. ANCILLARY PHYSICS (NON SEMESTER) SYLLABUS

I / II YEAR

MECHANICS, PROPERTIES OF MATTER, SOUND AND THERMAL PHYSICS

UNIT I


UNIT II


UNIT III

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

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

UNIT V

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

UNIT VI

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

UNIT VII

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

UNIT VIII

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


UNIT X


Reference Books:


B.Sc. ANCILLARY PHYSICS (NON SEMESTER) SYLLABUS

II / III YEAR

ELECTRICITY, ELECTRONICS, OPTICS, SPECTROSCOPY AND MODERN PHYSICS

UNIT I

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

UNIT II

UNIT III


UNIT IV


UNIT V

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

UNIT VI

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

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

UNIT VIII


UNIT IX


UNIT X


Reference Books:

ANCILLARY PHYSICS PRACTICALS – I

(ANY TWELVE)

1. Non Uniform Bending – Optic Lever.
2. Uniform bending – Pin and microscope.
3. Compound Pendulum – Determination of “g”
4. Torsion Pendulum – determination of M.I. and G.
6. Melde’s String – Frequency of fork.
7. Sonometer – Verification of Laws.
8. Calibration of Voltmeter (low range) – Potentiometer
9. Calibration of Ammeter – Potentiometer
10. Resistance and resistivity – Potentiometer
15. Comparison of Coefficient of Viscosities by Ostwald’s Viscometer.

ANCILLARY PHYSICS PRACTICALS – II

(ANY TWELVE)

1. Mirror Galvanometer – voltage and current sensitiveness.
2. LCR – Series resonance – determination of L & Q factor.
4. Dispersive power of prism – spectrometer.
5. Grating N and μμ Normal incidence– Spectrometer.
7. Bridge rectifier with filter circuit.
8. Transistor Static characteristics – C.E. mode
14. OP AMP as an adder and Subtractor.
16. LCR – Parallel resonance.