VIVEKANANDA COLLEGE

College with Potential for Excellence
(Residential & Autonomous-A Gurkula Institute of Life-Training)
(Affiliated to Madurai Kamaraj University)
Re-accredited with ‘A’ Grade (CGPA 3.59 out of 4.00) by NAAC

TIRUVEDAKAM WEST
MADURAI DISTRICT – 625 234

DEPARTMENT OF PHYSICS

B.Sc. PHYSICS

SYLLABUS

Choice Based Credit System

(For those who joined in June 2016 and after)
ABOUT THE COLLEGE

Vivekananda College was started by Founder-President Swamiji Chidbhavanandhaji Maharaj of Sri Ramakrishna Tapovanam, Tirupparaithurai, Trichy in 1971 on the banks of the river Vaigai which is blissfully free from the noise and hurry, the crowds and distraction of the city.

Vivekananda College is a residential college functioning under Gurukula pattern. It is Man-making education, that is imparted in this institution, Culture, character and curriculam are the three facets of ideal education that make man a better man. This is possible only when the teacher and taught live together, The Gurukula system of Training is therefore a humble and systematic attempt in reviving the age old GURUGRIHAVASA for wholesome education, Attention to physical culture, devotion to duty, obedience to teachers, hospitality to guests, zest for life, love for the nation, and above all, humility and faith in the presence of God etc. are the values sought to be inculcated. All steps are taken to ensure the required atmosphere for the ideal life training.

Vivekananda College, Tiruvedakam West, Madurai District-625 234 is an aided college established in 1971 and offers UG and PG courses. This College is affiliated to the Madurai Kamaraj University, Madurai. The College was reaccredited with ‘A’ grade (CGPA 3.59 out of 4.00) by NAAC in September 2015. The college was awarded College with Potential for Excellence by UGC in 2016.

VISION AND MISSION

Our Vision: To raise an army of neo-graduates steeped in the hoary culture of the motherland and dedicated to serving her as potential leaders in the manifold spheres of national effort.

Our Mission: A harmonious enrichment of physical, emotional and intellectual facets of a student’s personality to bring out his inherent PERFECTION.

OBJECTIVES OF THE INSTITUTION

1. To inculcate spiritual, ethical, moral and social values in all disciplines of study.
2. Simultaneous education of the Hand, Heart and Head. Only a sound body can hold a sound mind.
3. Provide opportunities for all round development of the students and excellence in higher education, research and extension in different disciplines.
4. Disseminate the findings of research to the community to facilitate its development.
5. To provide society citizens of sterling character.
6. To cater to the needs of the educationally backward people – the most backward, scheduled caste and tribe.
I Eligibility for Admission

Admission to B.Sc. – Physics Programme is open to candidates with +2 pass with Maths, Physics, Chemistry, Biology as major subjects.

For B.Sc.- Physics course offered in the college, a pass in the Higher Secondary Examination conducted by the Government of Tamil Nadu or an examination accepted as equivalent there to by the Syndicate of the MKU, subject to such conditions as may be prescribed therefore.

II Duration

The course is for a period of three years. Each academic year shall comprise of two semesters viz. Odd and Even semesters. Odd semesters shall be from June to November and Even Semesters shall be from December to April. There shall be not less than 90 working days which shall comprise 450 teaching clock hours for each semester (Exclusive of the days for the conduct of university end-semester examinations) for each semester.

III CBCS System

All Programmes offered in the college are run on Choice Based Credit System (CBCS). It is an instructional package developed to suit the needs of students to keep pace with developments in higher education and the quality assurance expected of it in the light of liberalization and globalization in higher education.

IV Semesters:

An academic year is divided into two semesters. In each semester, courses are offered in 15 teaching weeks. Each week has 30 working hours spread over 6 days a week.

V Credits:

The term 'Credit' refers to the weightage given to a course, usually in relation to the instructional hours assigned to it. The total minimum credits, required for completing the B.Sc. Programme is 140. The details of credits for individual components and individual courses are given in the above table.

VI Course:
Each Course is to be designed variously under lectures / laboratory / seminar / practical training / assignments to meet effective teaching and learning needs.

**VII Examinations:**

i). There shall be examinations at the end of each semester, for odd semesters in the month of October / November; for even semesters in April/May. A candidate who does not pass the examination in any course(s) shall be permitted to appear in such failed course(s) in the subsequent examinations to be held in October / November or April/May.

ii). A candidate should get registered for the first semester examination. If registration is not possible owing to shortage of attendance beyond condonation limit / regulations prescribed or belated joining or on medical grounds, the candidates are permitted to move to the next semester. Such candidates shall re-do the missed semester after the completion of the programme.

**VIII Condonation**

Students must have 75% of attendance in each paper for appearing the examination. Students who have 65% to 74% of attendance shall apply for condonation in the prescribed form with the prescribed fee. Students who have 50% to 64% of attendance shall apply for condonation in prescribed form with the prescribed fee along with the Medical Certificate. Students who have below 50% of attendance are not eligible to appear for the examination. They shall compensate the shortage after the completion of the programme.

**IX Question Paper Pattern**

Time: 3 Hours

Maximum Marks: 75

**SECTION-A** (10 X 1 =10 Marks)

**Answer All Questions**

(1-5) Multiple Choice

(6-10) Fill in the blanks

Two questions from each unit

**SECTION-B** (5 X 7 = 35 Marks)

**Answer All Questions**

(11-15) Questions shall be in the format of either (a) or (b)

One question from each unit

**SECTION-C** (3 X 10 = 30 Marks)

**Answer any THREE Questions**

(16-20) One question from each unit.

**X Evaluation:**

Performance of the students are evaluated objectively. Evaluation is done both internally and externally. They will be assessed continuously through Internal Assessment System and finally through summative (end) semester examination. To assess internally, there will be three examinations conducted centrally with a duration of two hours for each paper. In addition to continuous evaluation, the summative semester examination, which will be a written examination of three hours duration, would also form an integral component of the evaluation. The ratio of marks to be allotted to continuous internal assessment and to end semester examination is 25 : 75.

The pattern of internal valuation shall be:

Test: 20 Marks (the average of best two tests out of three tests)
Assignment: 5 marks

Total: 25 marks.

In respect of practical papers, the ratio of marks to be allotted to internal assessment and to summative (end) semester examination is 40 : 60. The internal marks will be calculated on the basis of marks secured at the model examination and marks awarded for the preparation of practical note book. The external marks will be calculated on the basis of the marks awarded by the internal examiner and the external examiner at the summative semester examination.

**XI Passing Minimum**

There is no passing minimum for Internal Assessment. The passing minimum for external Examinations shall be 27 out of 75 marks and passing minimum for a paper is 40%.

**XII Classification of Students**

Candidates who have secured not less than 40% of marks in each paper shall be declared to have passed in that paper. Candidates who obtain 40% and above but below 50% shall be declared to have passed in Third Class. Candidates who obtain 50% and above but below 60% of the aggregate marks in Part-III shall be declared to have passed in Second Class and those who obtain 60% of marks and above shall be placed in the First Class. Candidates who obtain 75% and above shall be declared to have passed in Distinction provided he has not re-appeared for any paper during the course of the study.

**XIII Failed Candidates**

A candidate who has arrears in any paper in a semester examination will be permitted to proceed to the next semester classes. A candidate who has arrears may appear again in these failed papers at the November/April examinations. The internal assessment marks already obtained by him shall be carried over for the subsequent appearance also.

**XIV Improvement of Internal Marks**

The student desirous of improving the internal assessment marks may request the Head of the Department. After obtaining permission from the Staff Council Meeting by the Head, the student may write improvement examinations in consultation with the course teacher. The marks obtained (when it is more than the previous marks) will be submitted to the Controller of Examinations for further adoption.

**XV Study Tour**

Students are expected to participate in the field visit and the study tours organized by the department. Though study tour/field trip carries no credit, it is compulsory for the students to attend whereby the students can get an opportunity to gain practical knowledge. As such, observational visit to selected social welfare organizations, industries, trade centres, exhibitions, places of historical importance and the like will be considered as extra-curricular activities.
VISION AND MISSION OF PHYSICS DEPARTMENT

VISION

Inculcating the basic and up to date knowledge in physical science to the first generation students from rural areas – by student centered learning methods and a mixture of traditional, current, and integrative pedagogical techniques.

The department has dedicated itself for lifelong learning through academicals and social programs.

MISSION

Prepare the student in assets of physics and the principles of analytical methods required for the competitive physical tests in the competitive world.

Kindle the knowledge of students to pursue higher studies and research programs. Making the students self employable with the Physics knowledge gained during their degree course of study.

To provide the tools and skills for advancing our knowledge of the universe and for providing solutions to challenges we face as individuals, communities, and societies.

A Brief History of the Department of Physics

At the time of inception of the college to Madurai University in the year 1971 Prof.R.Murugeshan was the first staff appointed in Physics department as a demonstrator to teach Physics for PUC. Three year B.Sc., Physics Major Course was introduced in the academic years 1973-1974. After the induction of Physics major course Prof M.Muthusamy and Prof. K.S.Srinivasanambirajan were appointed as Assistant Professors. Prof.M.Muthusamy leads the department as head of the department till to his retirement 31-05-2003. Prof.K.S.Srinivasanambirajan also retired from his service in the same academic on 31-05-2003. After that Prof.R.Murugeshan leads the department as head of the department of Physics till to his retirement on 31-05-2004. During his service Prof.R.Murugeshan published several books on different topics of Physics. His book on “Modern Physics” is very popular throughout our nation and is being prescribed as a text book in majority of the Indian Universities for under graduate course. Prof.A.P.Selvarajah acted as HOD from 01-06-2004 to 31-05-2014. Dr.P.K.Veeran acted as HOD from 01-06-2014 to 30.11.2015. Sri.P.Jeyasankar has taken over the charge as HOD of Physics from 01-12-2015 to till date. The department take special interest in teaching medical instrumentation, house hold electrical appliances and house wiring (Certificate Course) which are much useful for self employment. The department took special interest in teaching ideas, concepts and physical laws which is very useful to get through in the competitive examinations for appointments and to get admission in higher studies. Thursday meet is a unique programme conducted in our department which is organised, conducted and participated by our department students by taking seminars on current topics, conducting Science quiz and having a good academic discussion on current topics in the presence of faculty members which is not only useful to enhance their subject skill but to enrich their communicative skills also. Lab on wheel and Science exhibition are other programmes which are very useful for school students in nearby villages. Seminars, Guest lectures are frequently conducted inviting subject experts from Higher Academic Centres like IIT, ISRO, IIAP, etc.,
# SCHEME OF EXAMINATION
(For those who joined in 2016 and after)

## FIRST SEMESTER

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**TOTAL** 30 19

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### SIXTH SEMESTER

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DEPARTMENT OF PHYSICS
CBCS - DISTRIBUTION OF CREDIT
B.Sc. Physics
(For those who joined in June 2015 and after)

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FACULTY MEMBERS

1. Sri P. JEYASANKAR, M.Sc., M.Phil, PGDCA.,
   Head & Assistant Professor of Physics
2. Sri N.S. LAKSHMIKANTHAN, M.Sc., M.Ed., M.Phil, PGDCA, MCA.,
   Assistant Professor of Physics
3. Sri V. RAJENDRAN, M.Sc., M.Phil.,
   Assistant Professor of Physics
4. Dr. N. MEENAKSHI SUNDARAM, M.Sc., Ph.D., NET.,
   Assistant Professor of Physics
5. Sri S. GANESHAN, M.Sc., M.Phil.,
   Assistant Professor of Physics
   Assistant Professor of Physics
PART III: Core Subject Theory

<table>
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Objectives:

- To enable the students in order to learn the basic principles, theory and concepts of mechanics.
- To gain knowledge by the students in order to learn motion of bodies.
- To inspire interest for the knowledge of concepts in fluid dynamics.

UNIT I: MOTION IN ONE DIMENSION AND NEWTON’S LAWS


UNIT II: MOTION IN TWO AND THREE DIMENSIONS

Motion in Three Dimensions with Constant Acceleration - Newton’s Laws in Three Dimensional Vector form - Projectile Motion - Uniform Circular Motion - Frictional forces - The Dynamics of Uniform Circular Motion.

UNIT III: MOMENTUM AND SYSTEM OF PARTICLES


UNIT IV: ANGULAR MOMENTUM AND WORK AND KINETIC ENERGY


UNIT V: FLUID STATICS AND FLUID DYNAMICS

Fluids and Solids - Pressure and Density - Variation of Pressure in Fluid at Rest - Measurement of Pressure - General Concepts of Fluid flow - Streamlines and Equation of Continuity - Bernoulli’s Equation - Applications of Bernoulli’s Equation and Equation of Continuity.
TEXT BOOK: Physics, Volume 1, DAVID HALLIDAY, ROBERT RESNICK,& KENNETH S. KRANE 2002, fifth edition, John Wiley & Sons, INC.

Unit I: 2-4, 2-5, 2-6, 3 - 2, 3 - 3, 3 - 4, 3 - 5, 3- 6, 3 - 7
Unit II: 4 -1, 4 -2, 4 - 3, 4 – 5, 5 - 3, 5 - 4
Unit III: 6-1, 6-2, 6-3, 6-4, 6-5, 7 -3, 7-4, 7-5
Unit IV: 10-1, 10-2, 10-3, 10-4, 11-1, 11-2, 11-3, 11-4, 11-6, 11-7

REFERENCE BOOKS

OBJECTIVES: To gain knowledge about the electrical energies in order to
   ◆ learn motion of charges
   ◆ acquire basic knowledge of magnetic properties
   ◆ know about the alternating current and its circuits
   ◆ get a depth of knowledge in electricity and magnetism

UNIT – I CHARGE AND FIELDS

Basic concepts - Coulomb’s law - Super position Principle - Electric Field - Electric Field due to a point charge - Electric Dipole - Potential Energy of a Dipole in uniform Electric field - Electric field due to an Electric Dipole at an axial point - Electric field at a point on the equatorial line - Electric field due to an Electric dipole at any point - Lines of force - Gauss’s law - Differential form of Gauss law - An Insulated conductor - Electric field due to a uniformly charged sphere - Coulomb’s theorem

UNIT – II ELECTRIC POTENTIAL AND CAPACITORS

Potential Difference - Electric Potential as line Integral of Electric Field - Potential at a point due to a point charge - Relation between Electric field and Electric Potential. Capacitance of a spherical capacitor (outer and inner sphere earthed) - Capacitance of a cylindrical capacitor, Parallel plate capacitor - Capacitors in series and parallel - Energy stored in a charged capacitor - Change in energy of a parallel plate capacitor - Loss of energy on sharing of charges between two capacitors - Force of attraction between plates of a charged parallel plate capacitor - Types of capacitors

UNIT – III CURRENT AND RESISTANCE MEASUREMENTS

Current and current density - Expression for current density - Equation of continuity-Ohm’s law and Electrical conductivity-Carey Foster bridge - Potentiometer - measurement of low resistance (Kelvin Double Bridge method) comparison of capacitances of two capacitors - capacitance of capacitor (Kelvin’s null method)

UNIT – IV MAGNETIC EFFECT OF ELECTRIC CURRENT

Introduction - The Biot - Savat Law - Magnetic induction at a point due to straight conductor, circular coil carrying current - Hemholtz Tangent Galvanometer - Magnetic Induction at any point on the axis of a solenoid - moving coil Ballistic Galvanometer - current and voltage sensitivities of moving coil galvanometer measurement of charge sensitiveness - absolute capacitance of a capacitor -
comparison of two capacitance using B.G - Ampere’s circuital law - Differential form of Ampere’s law – Divergence of magnetic field vector B – Magnetic field inside a long seleniod

UNIT – V AC CURRENT, AC & DC MOTORS


TEXT BOOK:
Electricity and Magnetism by R. Murugeshan, S.Chand & Company Ltd., New Delhi (Fifth Edition - 2003)
Unit - I: Chapter 1 & 2 (1.1 - 1.11, 2.2 - 2.5, 2.11)
Unit - II: Chapter 3 & 4 (3.1 - 3.4, 4.2 - 4.5, 4.8 - 4.13)
Unit - III: Chapter 6 & 7 (6.1 - 6.4, 7.1 - 7.5)
Unit - IV: Chapter 10 (10.1 - 10.6, 10.11-10.15, 10.17-10.20)

REFERENCE BOOKS:
1. Electricity and magnetism by Brijlal and Subramaniam Ratan Prakashan Educational & University Publishers
PART – IV : Non Major Elective

Subject Title: SPACE SCIENCE

<table>
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Objectives:

- To enable the students in order to learn the concepts of Solar System
- To acquire basic knowledge of communication
- To understand the satellite launching

UNIT I


UNIT II


UNIT III

Communication system - Information – Transmitter – Channel – Noise - Receiver

UNIT IV


UNIT V

Satellite and Launching - Multistage Rocket – Pay load – Geo stationary Satellites – Fuel used in satellites – Launching

TEXT BOOKS:

3. The History of Science from 1946 to the 1990’s, Ray Spangenburg and Diane K. Moser, The Universities Press Book

REFERENCE BOOKS:

2. Encyclopedia of space, Heather couper, Nqel henbest Publisher: Dorling Kindersley,2009
### Part – III: Core Subject Theory

<table>
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#### Objectives:
- The aims is to provide the students to understand the basic principle and laws of thermodynamics
- To understand the concepts of entropy
- To enable the students in order to learn the basic principles, theory and concepts of Statistical mechanics

#### UNIT I - TRANSMISSION OF HEAT


#### UNIT II – BEHAVIOUR OF REAL GASES


#### UNIT III - THERMODYNAMICS FIRST LAW AND SECOND LAW

Thermodynamic system - Zeroth law of thermodynamics - work a path Dependent function - First law of theromodynamics- applications - Isothermal process - Adiabatic process - Isochoric process - Isobaric process - work done during an isothermal process and adiabatic process

Reversible and Irreversible process –Heat engines-Carnot’s Ideal Heat engine- Carnot’s Cycle- Carnot’s engine and refrigerator - Second law of thermodynamics-Carnot’s theorem

#### UNIT IV – STATISTICAL BASIS OF THERMODYNAMICS

UNIT V - QUANTUM STATISTICS


Units: Unit - I: Chapter – 15&8(15.1, 15.9, 15.11, 15.13, 15.14, 15.19, 8.12, 8.13, 8.21, 8.26)
Unit - II: Chapter - 2&7 (2.1, 2.8, 2.10, 2.12, 2.21, 2.24, 7.8, 7.19)
Unit - III: Chapter - 4 (4.1, 4.2, 4.5, 4.7, 4.10, 4.10.7, 4.10.4, 4.10.2, 4.10.3, 4.12, 4.13, 4.20, 4.21, 4.23, 4.24, 4.26, 4.28, 4.29)
Unit - IV: Chapter – 9,10&11 (9.1,9.2,9.5,10.1,10.4,10.15,10.18,11.3,11.4,11.6)
Unit - V: Chapter- 12 (12.1, 12.5, 12.6, 12.8, 12.10, 12.15)

REFERENCE BOOKS:

B.Sc. Physics CBCS Syllabus - SEMESTER – II
(For those who joined in June 2016 and after)

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**Objectives:**

- To provide a good foundation in optics
- To provide a knowledge of the behaviour of light
- To inspire interest for the knowledge of concepts is physical and geometrical optics
- To gain knowledge by the students in order to learn sound waves

**UNIT I – INTERFERENCE**

Total Internal Reflection - The Doppler Effect for Light - Two - Source Interference - Double Slit Interference - Coherence Intensity in Double Slit interference - Michelson’s interferometer.

**UNIT II – DIFFRACTION**


**UNIT III – POLARIZATION**

Polarization of Electromagnetic waves - Polarizing Sheets - Polarization by Reflections - Double Refraction - Circular polarization - Polarization by Scattering.

**UNIT IV - OSCILLATIONS**

Oscillating systems - The Simple Harmonic Oscillator - Simple Harmonic Motion - Energy in Simple Harmonic Motion - Applications of Simple Harmonic Motion - Simple Harmonic Motion and Uniform Circular motion - Damped Harmonic Motion - Forced Oscillations and Resonance - Two body Oscillations.

**UNIT V - SOUND WAVES**

Properties of Sound Waves - Travelling Sound Waves - The Speed of Sound - Power and Intensity of Sound Waves - Interference of Sound Waves - Standing longitudinal Waves - Vibrating Systems and Sources of Sound.

**TEXT BOOK:**

1. Physics, Volume 1, David Halliday - Robert Resnick, Kenneth S. Krane 2002,
   Unit IV: Chapter 17:17.1 - 17.9 Units V: Chapters 19: 19.1 - 19.7
Unit I: Chapter 39:39.5, 39.6  Unit I: Chapters 41: 41.1 - 41.4, 41.6
Unit II: Chapter 42: 42.1 - 42.3, 42.5  Unit II: Chapter 43: 43.1 - 43.5
Unit III: Chapter 44:44.1, 44.2, 44.3, 44.4, 44.5, 44.6.


REFERENCE BOOKS:

1. Physics for Scientists and Engineers with Modern Physics, Raymond A. Serway,

******************************************************************************
B.Sc. Physics CBCS Syllabus - SEMESTER – II
(For those who joined in June 2016 and after)

| PART – III : Core Subject Practical
| Subject Code: 06CP23 | Hours per week: 2 | Credit: 2 |
| Sessional Marks: 40 | Summative Marks: 60 | Total Marks: 100 |

Objectives:

❖ To develop the practical skills by applying the laws and concepts in physics experiments

(Any fourteen experiments)

1. Compound Pendulum
2. Bifilar Pendulum
3. Torsional Pendulum
4. Surface Tension & Interfacial Surface Tension by drops
5. Viscosity – Stokes method
6. Helmholtz Resonator
7. Sonometer – Frequency of fork & Verification of Laws
8. Sonometer – Frequency of A.C.
9. Meld’s Strings – Frequency of A.C.
10. Lee’s Disc – Thermal Conductivity of a Bad conductor
11. Spectrometer – A & D
12. Spectrometer – i-d Curve
13. Spectrometer – Dispersive power of prism
14. Spectrometer – Grating -Normal incidence
15. Air wedge
16. Newton’s Rings
**B.Sc. Physics CBCS Syllabus - SEMESTER – II**
*(For those who joined in June 2016 and after)*

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**Objectives:**
- *To enable the students in order to learn the basic principles, theory and concepts of power supplies*
- *To gain knowledge by the students in order to learn electric lamps and appliances*

**UNIT I**


**UNIT II**

Difference between A.C. and D.C.- Stabilized power supply – A.C. adopter – Transformer – Types – Choke – Uses

**UNIT III**

Electric lamps – Incandescent lamp – Fluorescent lamp – Mercury and Sodium vapour lamp – Halogen lamps – Different colours – CFL (Compact Fluorescent Lamp) – LED – Seven segment display

**UNIT IV**

Electric heaters – Water heaters – Gaiser heater – Instant water heater – Immersion rod heater

**UNIT V**

Mixi – Grinder – Electric iron box – Electric fan (Table and Ceiling fans) – Speed control using regulators in fan

**TEXT BOOK**

B.Sc. Physics CBCS Syllabus - SEMESTER – III  
(For those who joined in June 2016 and after)

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Objectives:
- To understand the fundamentals of different combinations of resistive circuits
- To familiarize of network conversion
- To study the applications of circuit theorems in electric circuits both in dc and ac
- To study the phasors and complex numbers in ac circuit
- To analyze the RC and RL networks for sine waves

UNIT I: SERIES PARALLEL COMBINATIONS AND CIRCUIT THEOREMS CONVERSIONS

UNIT II: AC CHARACTERISTICS AND ANALYSIS
Introduction to phasors – The complex number system – Rectangular and Polar forms of complex numbers – Mathematical operation of complex numbers – Non sinusoidal waveforms – Harmonics

UNIT III: RC CIRCUIT ANALYSIS

UNIT IV: RL CIRCUIT ANALYSIS

UNIT V: CIRCUIT THEOREMS IN AC ANALYSIS AND FILTERS


REFERENCE BOOKS:


B.Sc. Physics CBCS Syllabus - SEMESTER – III  
(For those who joined in June 2016 and after)

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Objectives:

- To understand the developments leading to various atom models.
- To explain the role of different quantum number and electron spin in atomic phenomena.
- To enable students to learn microwave spectroscopy.
- To familiarize the basic concept of IR spectroscopy.
- To acquire the knowledge of Raman spectroscopy.

UNIT-I-ATOM MODELS


UNIT-II-QUANTUM NUMBERS AND COUPLING SCHEMES

Quantum numbers associated with the Vector atom model-Coupling schemes-The Pauli exclusion principle-Magnetic dipole moment due to orbital motion of the electron- Magnetic dipole moment due to Spin-The Stern and Gerlach experiment-Spin Orbit coupling – Optical spectra-Zeeman effect –Larmor’s theorem-Anomalous Zeeman effect-Stark effect.

UNIT-III-MICROWAVE SPECTROSCOPY

The Rotation of Molecules-Rotational Spectra-The Rigid Diatomic Molecule-The Intensities of Spectral Lines-Linear Molecules-Symmetric Top Molecule-Asymmetric Top Molecules-Techniques and Instrumentation-Chemical Analysis By Microwave Spectroscopy-The Microwave oven.

UNIT-IV-INFRA-RED SPECTROSCOPY

The Energy of a Diatomic Molecule-The Simple Harmonic Oscillator-The Anharmonic Oscillator-The Diatomic Vibrating Rotator-Techniques and Instrumentation-(Outline, Double and Single Beam Operation only).
UNIT-V-RAMAN SPECTROSCOPY


TEXT BOOKS:

   UNIT-I -Chapter 6: 6.1 to 6.10, 6.12
   UNIT-II-Chapter 6: 6.13 to 6.15,6.18 to 6.24 and 6.26 to 6.28
2. FUNDAMENTALS OF MOLECULAR SPECTROSCOPY, N.BANWELL and M.McCASH, Tata McGRAW HILL Publishing Company, New Delhi, 2007
   UNIT-III-Chapter 2: (2.1,2.2,2.3,1.2.1,3,4.1,2,4.2,2.4.3,2.5,2.6,2.7)
   UNIT-IV-Chapter 3: (3.1,1,3.1.2,3.1.3,3.2,1,3.8.1,3.8.2)
   UNIT-V-Chapter 4: (4.1.1,4.1.2,4.2.1,4.2.2,4.2.3,4.6)

REFERENCE BOOKS:

1) Atomic Physics, J.B. Rajam, S.Chand & Company Ltd, New Delhi, 2008.
B.Sc. Physics CBCS Syllabus - SEMESTER – III
(For those who joined in June 2016 and after)

PART – IV : Skill Based Subject

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Objectives:
- To familiarize the solar radiation and importance
- To study the different solar collectors
- To enable knowledge about air heater
- To develop the solar energy storing devices

UNIT – I
The structure of the sun – The solar constant – Solar radiation outside the Earth’s atmosphere - Solar energy measuring equipments – Pyranaometers – Sunshine recorder

UNIT – II
General description of flat-plate collectors – Effect of dust and shading – Selection of materials for flat-plate collectors

UNIT – III
Solar collectors – Focusing type – Introduction – solar concentrators and Receiver Geometries

UNIT – IV
Solar cell modules – Advantages and Disadvantages of Photovoltaic Solar energy conversion – Applications of Solar Photovoltaic system – PV Technology in India.

UNIT – V
Some additional methods of solar energy utilization – solar furnaces-solar cooking – application of solar energy in space

TEXT BOOK:
Solar energy utilization, G.D.Rai, Khanna Publishers, Delhi, 2006
Unit I: 3.1, 3.2, 3.4, 4.1, 4.3, 4.4 Unit II : 5.3, 5.11, 5.12
Unit III: 7.1, 7.3. Unit IV: 15.6, 15.7, 15.10, 15.14 Unit V: 16.1, 16.5, 16.8

REFERENCE BOOK: Non-Conventional Energy Sources, G.D.Rai, Khanna Publishers, Delhi, 2005
PART – III : Core Subject Theory

Subject Title: ANALOG ELECTRONICS

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Objectives:

- To study the characteristics of diodes and their applications
- To familiarize bipolar and unipolar transistor and applications
- To enable knowledge about different transistor amplifier circuits
- To study the different communication systems

UNIT- I:


UNIT- II:


UNIT- III:


UNIT - IV:


UNIT – V:


TEXT BOOKS:

   Chapters: UNIT 1: 9.7 to 9.23
   UNIT 2: 11.15 – 11.25, 22.1 – 22.17
   UNIT 4: 17.5 – 17.7, 17.10 – 17.20
   UNIT 5: 19.1 – 19.18
2) Basic Electronics (Solid State), B.L Theraja, S.Chand & Company Ltd., 2002
   UNIT 4: 31.19 – 31.31

REFERENCE BOOKS:

1) Electronic Principles – Albert Paul Malvino (Sixth Edition), Sixth Reprint 2013.
2) Electronic Devices and Circuits – Jacob Millman Christos C. Halkias,1999
PART – III : Core Subject Theory

Subject Title : MATHEMATICAL PHYSICS

<table>
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Objectives:

- To become familiar with vectors and matrices
- To find the roots of transcendental equations by different methods
- To learn the solutions of linear algebraic equations
- To understand the importance of interpolation in different fields
- To become familiar with the numerical differentiation and integration by various methods


UNIT 3: Solutions of Simultaneous Linear Algebraic Equations: Gauss elimination method – Gauss seidel method of iteration

UNIT 4: Interpolation, Central Difference Interpolation Formulae: Gregory-Newton forward interpolation formula – Gregory-Newton backward interpolation formula – Gauss’s forward interpolation formula – Gauss’s backward interpolation formula

UNIT 5: Newton’s forward difference formula to get the derivative – Newton’s backward difference formula to compute the derivative – Trapezoidal rule – Simpson’s one third rule

TEXT BOOKS:

1. Mathematical Physics – Satya Prakash (Sultan Chand & Sons, New Delhi) Reprint 2005
   Chapters: Unit 1: 1.1(a) to 1.1(d), 1.2, 2.5, 2.31, 2.32
Chapters: Unit 2: 3.1.1, 3.2 to 3.4  
Unit 3: 4.2, 4.9  
Unit 4: 6.2, 6.3, 7.3, 7.4  
Unit 5: 9.2, 9.3, 9.9, 9.13

REFERENCE BOOKS:

B.Sc. Physics CBCS Syllabus - SEMESTER – IV
(For those who joined in June 2016 and after)

<table>
<thead>
<tr>
<th>PART – III : Core Subject Practical</th>
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<tbody>
<tr>
<td>Subject Code: <strong>06CP43</strong></td>
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<tr>
<td>Sessional Marks: <strong>40</strong></td>
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</tbody>
</table>

*(Any fourteen experiments)*

1. Potentiometer – Ammeter calibration
2. Potentiometer- Calibration of high range voltmeter.
3. Carey Foster Bridge- measurement of low resistance
4. Self Inductance – by Anderson’s bridge
5. Quantity sensitiveness of Ballistic Galvanometer
6. Internal resistance of a battery using B.G
7. M1/M2 deflection magnetometer – Tan A, Tan B
8. M & BH –Deflection Magnetometer
9. Field along the axis of circular coil – deflection methods
10. Grating – minimum deviation – dispersive power
11. Spectrometer- small angled prism
12. $i-i'$ curve –prism-spectrometer
13. Superposition theorem
14. Maximum power transfer theorem
15. LCR series resonance circuit
16. LCR Parallel resonance circuit
17. Comparision of EMF’s –Using spot deflection galvanometer
18. Comparision of Capacitances - Using spot deflection galvanometer
B.Sc. Physics CBCS Syllabus - SEMESTER - IV
(For those who joined in June 2016 and after)

<table>
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<th>PART – IV : Skill Based Subject</th>
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<tbody>
<tr>
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<td>Subject Code: 06SB41</td>
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</table>

Objectives:
- To be familiar with Astronomical instruments, stellar motions
- To study about sun and other stars
- To know basic ideas about galaxy and cosmology


TEXT BOOK:

Chapters: Unit 1: 1.1 to 1.5
Unit 2: 2.5, 2.6, 3.9, 3.10
Unit 3: 5.1 to 5.3, 5.5, 5.6, 5.8
Unit 4: 7.1, 7.2, 7.5, 8.1, 9.1 to 9.7
Unit 5: 16.1, 16.2, 16.10, 21.1, 21.2
REFERENCE BOOKS:

Objectives:

This course aims at study of crystal structure and crystal planes, imperfections in crystals, dielectric and thermal properties, magnetic properties and superconductivity

UNIT - I - CRYSTAL STRUCTURE AND CRYSTAL PLANES

Introduction – Space lattice - Stacking sequences in metallic crystal structures - Directions in Crystals - Planes in crystals - Miller indices - Distances of separation between successive (hkl) planes.

UNIT - II - IMPERFECTIONS IN CRYSTALS


UNIT - III - DIELECTRIC AND THERMAL PROPERTIES

Introduction - Various polarization processes - Internal field - Frequency dependence of dielectric constant - Dielectric breakdown - Ferro and Piezo electricity-Phonons of mono atomic and dimensional lattice-Specific heat of solids (classical theory, Einstein’s theory of the specific heat, Debye’s theory of the specific heat).

UNIT - IV - MAGNETIC PROPERTIES


UNIT - V - SUPER CONDUCTIVITY

TEXT BOOKS:

1. Solid State Physics, P.K. Palanisamy, 2004,
   Scitech Publications (India) Pvt. Ltd., Chennai
2. Solid State Physics, P.K. Palanisamy, 2006,
   Scitech Publications, (India) Pvt. Ltd., Chennai

Unit I: 2.1 - 2.3, 3.1 - 3.4
Unit II: 3.5, 3.6, 4.1 - 4.8
Unit III: 7.1 - 7.6 & (7.2, 7.3 – 2006 edition)
Unit IV: 8.1 - 8.10
Unit V: 10.1 - 10.12

REFERENCE BOOKS:

(i) Solid State Physics, S.O. Pillai, Revised Sixth Edition 2005,
    New Age International (P) Ltd. New Delhi
(ii) Solid State Physics, M.A. Wahab, Second Edition 2005,
     Structure and Properties of Material
(iii) Solid State Physics, S.T. Gupta and V. Kumar, Eighth Edition 2003,
PART – III : Core Subject Theory
Subject Title: DIGITAL ELECTRONICS

<table>
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<tr>
<td>Sessional Marks: 25</td>
<td>Summative Marks: 75</td>
<td>Total Marks: 100</td>
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</tbody>
</table>

Objectives:

- To learn the Digital Electronic fundamentals and circuits such as Number system and Codes, Combinational circuits and Data Processing circuits
- To know more about Arithmetic circuits, Clocks and Timing circuits
- To gain in-depth knowledge about Flip-flops, Registers and Counters, A/D and D/A converters
- To gain knowledge about Communication systems and Types of Modulation
- To learn about Microprocessor, Arithmetic operators like Addition and Subtraction

UNIT I: DIGITAL LOGIC, COMBINATIONAL LOGIC CIRCUITS, DATA PROCESSING CIRCUITS AND NUMBER SYSTEMS AND CODES

Basic gates – Universal logic gates- (NOR, NAND) – AND, OR and INVERT gates - Boolean Laws and Theorems - Multiplexers - Demultiplexers - 1 of 16 decoder - BCD to Decimal decoders - Seven segment Decoders - Encoders - Exclusive OR gates - Binary to Decimal conversion - Decimal to Binary conversion - Octal numbers - Hexadecimal numbers - The ASCII code - The excess 3 code - The gray code.

UNIT II: ARITHMETIC CIRCUITS AND CLOCKS AND TIMING CIRCUITS


UNIT III: FLIP – FLOPS


Registers and Counters: Types of Registers – Serial In-Serial Out – Serial In-Parallel Out – Asynchronous counters - Synchronous counters

D/A Conversion and A/D Conversion Variable, Resister Networks - Binary ladders – D/A converters(Available D/A converters only) - A/D converter (Simultaneous conversion) – A/D techniques – Dual-slope A/D conversion
UNIT IV: COMMUNICATION SYSTEMS
Theory of Frequency and Phase Modulation – Noise and Frequency Modulation (Effect of Noise on Carrier-Noise Triangle, Pre-emphasis and De-emphasis, Other form of Interference) – Generation of Frequency Modulation – Pulse Modulation

UNIT V: MICROPROCESSOR
Microprocessor - Initiated operations and 8085 Bus Organization - Internal Data operations and the 8085 Registers - The 8085 microprocessor (Pinout and signals diagram only) - The 8085 A microprocessor functional block diagram - The 8085 instruction set - Review of the 8085 operations - Instruction word size - Overview of the 8085 instruction set. Addition of two 8-bit numbers; Sum 8 bits – 8 bit subtraction – Find One’s Complement of an 8 bit number – Find Two’s Complement of an 8 bit number

TEXT BOOKS:
UNIT I TO UNIT III

UNIT IV:

UNIT V:
1. Microprocessor Architecture, programming and applications with the 8085 Ramesh S. Gaonkar (Fourth Edition), 2006

CHAPTERS:
UNIT I: 2.1 - 2.3, 3.1,4.1 – 4.7, 5.2 -5.8 UNIT II: 6.1 – 6.8, 7.1 – 7.5
UNIT III: 8.1 - 8.3, 8.5 – 8.7, 9.1 – 9.3, 10.1,10.3, 12.1, 12.2, 12.3(Available D/A converters only), 12.5, 12.8, 12.9
UNIT IV: 5.1, 5.2.1, 5.2.2, 5.2.3, 5.3, 13.2
UNIT V: 1) 2.11, 2.12, Figure 3.1, Figure 3.7, 5.21, 5.22, 5.31, 5.5
6.3, 6.4, 6.9, 6.11

REFERENCE BOOKS:
B.Sc. Physics CBCS Syllabus - SEMESTER - V  
(For those who joined in June 2016 and after)

PART – III : Core Subject Practical

<table>
<thead>
<tr>
<th>Subject Title</th>
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<td>40</td>
<td>60</td>
<td>100</td>
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</table>

(Any fourteen experiments)

1) Semiconductor Diode Characteristics
2) JFET Characteristics
3) H – Parameters of Transistors
4) Measurement of Op-Amp parameters
5) Calculation of RMS value of Sine and Triangular wave form
6) Split Power supply
7) Study of Logic gates – Using discrete components
8) Study of Logic gates – Using ICs(7408, 7400, 7404, 7432)
9) Integrator, Differentiator using discrete components
10) Clipping and Clamping circuits
11) Characteristics of Zener Diode
12) Characteristics of Bipolar Transistors
13) Study of Half adder and Full adder using 7486 and 7408
14) Study of Half Subtractor and Full Subtractor
15) Rectifiers and Filters
16) Characteristics of Photo diode and Photo Transistor
PART – III : Elective Subject Theory

<table>
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<tr>
<th>Subject Title</th>
<th>OBJECT ORIENTED PROGRAMMING WITH C++</th>
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<td>Subject Code</td>
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Objectives:

- To learn the most widely used OOP language, the need, principles and applications of OOP.
- To know about the basic concepts like Tokens, Expressions, Control structures and Functions in C++.
- To familiarize the concepts such as Classes and Objects.
- To know about Constructors, their types, Destructors, Operator overloading and Type conversions.
- To learn salient features as Inheritance, its types and Virtual Base Class.

UNIT I:

Principles of Object-Oriented Programming:

Software crisis - Software evolution - A look at procedure - oriented programming - object oriented programming paradigm - Basic concepts of object oriented programming - Benefits of OOP - Object oriented languages - Applications of OOP.

Beginning with C++:

What is C++? - Applications of C++ - A simple C++ program - More C++ statements - An example with class - structure of C++ program - More C++ statements - An example with class - Structure of C++ program - Creating the source file - compiling and linking.

UNIT II:

Token, Expressions and Control Structures:

Introduction - Tokens - Keywords - Identifiers and constants - Basic Data types - User Defined Data Types - Derived Data Types - Symbolic constants - Type compatibility - Declaration of variables - Dynamic initialization of variables - Reference variables - operators in C++ - Scope resolution operator - member Dereferencing operators - Memory management operators - Manipulators - type cast operator - Expressions and their types - Special assignment expressions - Implicit conversions - Operator overloading - Operator precedence - control structures.
Functions in C++:


UNIT III: Classes and Objects:

Introduction - C structures revisited - specifying a class - Defining member functions - A C++ program with class - Making an outside function inline - Nesting of member functions - private member functions - Arrays within a class - memory allocation for objects - Static Data members - Static member functions - Arrays of objects - Objects as function arguments - Friendly functions.

UNIT IV:

Constructors and Destructors:

Introduction - Constructors - Parameterised constructors - Multiple constructors in a class - constructors with default arguments - Dynamic initialization of objects - copy constructor - dynamic constructors - destructors.

Operator Overloading and Type conversions:

Introduction - Defining operator overloading - Overloading unary operators - Overloading Binary operators - Overloading Binary operators using friends - Rules for overloading operators - Type conversions.

Unit V: Inheritance: Extending classes:


TEXT BOOK:


Chapters: Unit I: 1.1 - 1.8, 2.1 - 2.8 Unit II: 3.1 - 3.25, 4.1 - 4.12 Unit III: 5.1 - 5.15 Unit IV: 6.1 - 6.8, 6.11, 7.1 - 7.5, 7.8, 7.9. Unit V: 8.1 - 8.10

REFERENCE BOOKS:

PART – IV : Skill Based Subject

Subject Title: FIBRE OPTIC COMMUNICATION

<table>
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<th>Subject Code: 06SB51</th>
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<tr>
<td>Sessional Marks: 25</td>
<td>Summative Marks: 75</td>
<td>Total Marks: 100</td>
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</table>

Objectives:

- To provide a good foundation in fibre optics
- To enable the students in order to learn the basic principles, theory and concepts of fibre optics.
- To gain knowledge about different fibre optic fabrication process.

UNIT I: REFRACTIVE INDEX AND VELOCITY OF LIGHT

Propagation of light in different media – Propagation of light waves in an optical fibre - Basic structure of an optical fibre and propagation of light wave through it – acceptance cone and numerical aperture.

UNIT II: CLASSIFICATION OF OPTICAL FIBRE:

Fibre classification – Stepped index fibre – stepped index multimode fibre – graded index multimode fibre – plastic fiber

UNIT III: FIBRE FABRICATION

Classification of fibre fabrication-external chemical vapour deposition – axial vapour deposition-internal chemical vapour deposition- multi element glasses- phasil system.

UNIT IV: LED & SEMICONDUCTOR LASER

Basic theory of double hetero junction LED (DHLED) - Different LED structures- basic principles of laser action —p n junction photodiode – p-i-n photodiode – p-i-n- avalanche diode – phototransistors.

UNIT V: OPTICAL FIBRE COMMUNICATION

Transmitter for Fibre optic communication – digital laser transmitter- analog laser transmitter – Fibre optic receiver- Important applications of integrated optic fibre technology.

TEXTBOOK:


Unit I: 2.1 to 2.5
Unit II: 3.1 to 3.3, 3.5, 3.6
Unit III: 4.1 to 4.6
Unit IV: 9.2(a), 9.3, 10.6 to 10.9
Unit V: 15.2, 15.7, 15.8, 15.12, 15.2

REFERENCE BOOKS:

SEMMESTER – V
(For those who joined in June 2014 and after)

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<td>Subject Title: Environmental studies</td>
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<td>Sessional Marks: 25</td>
<td>Summative Marks: 75</td>
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2hrs/week 24hrs

Objectives:
- Disseminate information of Environment of national and international issues
- Environmental consciousness creation among the students
- Facilitation of environmental leadership among students

Unit-I 5 hrs
Introduction – Nature, scope and importance of Environmental studies – Natural Resources and conservation – forest, water and energy.

Unit-II 5 hrs
Ecosystem – concept – structure and function, energy flow, food chain, food web and ecological pyramids

Unit-III 5 hrs
Biodiversity – definition, types – values – India, a mega diversity zone – Hotspots – Endangered and endemic species – threat to biodiversity and conservation

Unit-IV 5 hrs

Unit-V 4hrs

TEXT BOOK:
Environment studies – R.Murugesan (2009), Milleneum Publications. Madurai-16
Objectives:

- Introduction to Nucleus, its structure, Detectors of nuclear Radiation and Particle Accelerators
- To learn about Radioactivity
- To gain knowledge about Artificial transmutation of elements, Discovery, Properties and Classification of neutron
- To learn more about Nuclear fission and fusion and Nuclear Reactors
- To understand the Elementary particles

UNIT I:


UNIT II:


UNIT III:

The discovery of artificial transmutation – Bohr’s theory of nuclear disintegration – Threshold energy of endoergic reaction – Preparation of Radioelements – Applications of Radioisotope – The discovery of Neutron – Basic properties of neutron – Classification of neutron – Neutron sources – Neutron deduction
UNIT IV:

Nuclear fission – Energy released in fission – Chain reaction – Atom bomb – Nuclear reactors – Nuclear fusion – Source of stellar energy – Pressurized water reactor – Boiling water reactor – Fast Breeder reactor

UNIT V:


Chapters

Unit I:  27.2 – 27.11, 29.3, 29.5, 29.6, 29.7, 30.4, 30.5, 30.6
Unit III:  34.1, 34.2, 34.6, 34.10 – 31.16
Unit IV:  35.2 – 35.7, 36.1 – 36.3
Unit V:  38.1 – 38.4, 38.7, 37.12 – 37.15

REFERENCE BOOKS:

PART – III : Core Subject Practical

Subject Title: MAJOR PRACTICAL - IV

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<td>Sessional Marks: 40</td>
<td>Summative Marks: 60</td>
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(Any fourteen experiments)

1) Verification of De Morgan’s Theorem using ICs
2) Summing and Difference Amplifiers using IC 741
3) Op-Amp Schmitt trigger circuits
4) Square and Triangular wave generators using IC 741
5) Study of BCD Seven Segment Decoder
6) Study of Counters
7) Shift Registers IC 7495
8) Digital to Analog Converter
9) Sine wave operator – Wien Bridge Oscillator
10) OP-AMP filters
11) Multivibrator using Transistor
12) Bistable Multivibrator using Transistor
13) Square and Triangular wave generators using IC 555
14) Astable Multivibrator using Transistor
15) Single stage Amplifier
16) Hartley Oscillator
17) Colpitt’s Oscillator
18) Assembly Level Programming – Using 8085 Microprocessor Kit (Simple Programs)
B.Sc. Physics CBCS Syllabus - SEMESTER - VI
(For those who joined in June 2016 and after)

<table>
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<tr>
<th>PART – III : Elective Subject Theory</th>
<th>Subject Title : MODERN PHYSICS</th>
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Objectives:

- To learn the basic ideas of Lagrangian Mechanics
- To know about Hamiltonian Mechanics
- To gain idea about Particle Properties, Wave Properties of particles
- To learn basic concepts about Quantum Mechanics
- To know ideas of Theory of Relativity

UNIT - I - LAGRANGIAN MECHANICS


UNIT - II - HAMILTONIAN MECHANICS


UNIT - III PARTICLE PROPERTIES

Photoelectric effect – Compton effect-

Wave Properties of Particle: De-Broglie waves - waves of probability - Describing a wave - phase and group velocities - Davisson and Germer experiment - Particle in a Box - Uncertainty Principle - Uncertainty principle and its applications.

UNIT - IV - QUANTUM MECHANICS

Quantum mechanics - Wave equation - Schrodinger’s equation (Time dependent form and Independent form) - Linearity and superposition - Expectation values - operators particle in a Box - Finite Potential Well - Tunnel effect - Harmonic Oscillator - Schrodinger’s equation for the hydrogen atom - Separation of Variables.
UNIT - V - THEORY OF RELATIVITY


TEXT BOOKS:

   Unit I - Chapter 1: 1.2 to 1.8 Chapter 2: 2.1 to 2.5, 2.9(2.9.1, 2.9.2 & 2.9.10)
   Unit II - Chapter 3: 3.2 to 3.7 & 3.9 (3.9.1, 3.9.2 & 3.9.4)

   Unit - III: Chapter 2: 2.3 & 2.7 Chapter 3: 3.1 to 3.9
   Unit - IV: Chapter 5: 5.1 to 5.11 Chapter 6: 6.1 and 6.2

   Unit V: Part I - Relativity - 1.1 to 1.16

REFERENCE BOOKS:

B.Sc. Physics CBCS Syllabus - SEMESTER - VI
(For those who joined in June 2016 and after)

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<th>PART – IV : Skill Based Subject</th>
<th>Subject Title : NANO TECHNOLOGY</th>
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<td>Summative Marks: 75</td>
<td>Total Marks: 100</td>
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Objectives:

- To understand the fundamentals of Nanotechnology
- To give a general introduction to crystal growth
- To impart basic knowledge on various synthesis and characterization techniques involved in nanotechnology.

UNIT I: Introduction – Nanotechnology – Nanomaterials – Types of nanomaterials – Properties of Nanomaterials


UNIT III: Growth techniques of nanomaterials – Role of Bottom-up and Top-Down approaches in nanotechnology - Sol gel process – Electrodepsotion - Sputtering-Spray pyrolysis.


UNIT V: Carbon nanotubes - Nanocomposite – Types of nanocomposite – Application of nanomaterial’s

TEXT BOOK:

Unit I: 1.1 to 1.4
Unit II: 2.1 to 2.6
Unit III: 6.1, 6.2, 6.4.2, 6.4.7, 6.4.8
Unit IV: 7.1 to 7.4
Unit V: 8.2 to 8.3

REFERENCE BOOK:
B.Sc. Physics CBCS Syllabus - SEMESTER - VI
(For those who joined in June 2016 and after)

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</table>

Objectives:

- To enable the students to get through in various competitive examinations like Government service, Entrance examinations for higher studies
- Objective type questions are taken from various areas of Physics like Mechanics, Properties of matter, Thermodynamics, Optics, Sound, Electricity, Magnetism, Electronics and Modern Physics
- To enhance the basic principles and ideas of physical concepts, Reasoning can be improved

UNIT I:

Units of physical quantities and their dimensions – Particle dynamics, projectiles, conservation laws and collision two bodies – Circular motion, Rotating frames of reference, Conical and Foucault’s pendulum – Rotational motion, Centre of mass, moment of inertia – Simple Harmonic motion and Harmonic oscillator – Gravitation, Escape velocity & Artificial satellites – Mechanics of fluids: Surface tension & Viscosity – Elasticity

UNIT II:


UNIT III:


UNIT IV:

Atomic structure and positive rays – X rays and photoelectric effect – Matter waves, uncertainty principle, wave mechanics and special theory of relativity

UNIT V:


TEXT BOOK:

1) Objective Physics by Dr. S.L. Kakani, Sultan Chand & Sons, New Delhi, 6th Edition, 1995

CHAPTERS:

UNIT I: Chapter 1 Pages 60 to 278
UNIT II: Chapters 2 & 3 Pages 279 to 471
UNIT III: Chapter 4 Pages 472 to 617
UNIT IV: Chapter 4 Pages 618 to 759
UNIT V: Chapter 4 Pages 760 to 871
PART – III: Skill Based Subject

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<td>Sessional Marks: 25</td>
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Objectives:
- To learn basic design principles of Medical Instruments and their components
- To know about Electrocardiography – Principles, Lead configuration
- To study about Electroencephalography – Brain waves, Placement of Electrodes and Analysis
- To gain knowledge about Operation Theatre Equipments, Surgical diathermy
- To provide in-depth study of Bio-Medical Instrumentation like Lasers, Nuclear Imaging Techniques, Magnetic Resonance Imaging, Positron Emission Tomography

UNIT I
MEDICAL INSTRUMENTS: Introduction – Design of Medical Instruments – Components of Bio-Medical Instrument system

UNIT II
ELECTROCARDIOGRAPHY (ECG): Origin of cardiac action potential ECG lead configuration – Block diagram of ECG Recording set up

UNIT III
ELECTROENCEPHALOGRAPHY (EEG): Origin of EEG – Brain waves – Placement of electrodes – Recording set up – Analysis of EEG

UNIT IV
OPERATION THEATRE EQUIPMENT: Introduction – Surgical diathermy – Ventilators – Anesthesia machine

UNIT V

TEXT BOOK: Bio-Medical Instrumentation – Dr.M. Arumugam
Anuradha Publications, Kumbakonam – Tenth Reprint-2006

REFERENCE BOOK: Bio-Medical Electronics & Instrumentation – Prof. S.K. Venkata Ram

CHAPTERS:
- Unit I: 2.1 – 2.3
- Unit II: 4.1, 4.3
- Unit III: 4.4
- Unit IV: 6.1, 6.2, 6.8, 6.9
- Unit V: 10.3

(Basic principle of Laser action, Laser instrumentation, Advantages of Laser surgery), 10.6, 10.10.1, 10.10.8, 10.11
SEMESTER – VI
(For those who joined in June 2008 and after)

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UNIT I: The heart of Education


UNIT II: The Value of Body and Life Energy

Introduction – what are the causes for paid, Disease and death? Three Basic needs for all living Beings – Personal Hygene Five Factors of Balance in Life – The need and benefits of physical Exercise – The value and Base of Life energy – The value and Base of Bio-magnetism - You are your own best caretaker.

The Marvelous nature of mind


UNIT III: Analysis of Thought


Benefits of Blessings

Effects of good vibrations – Make Blessing a Daily Habit

UNIT IV: Moralisation of Derive

Introduction – moralization of desire - Analyse your desires – Summary of practice.

Neutralisation of Anger:

Introduction – meaning – characteristics of Anger – Anger is a Destructive emotion – Anger spoils our relationship with others – Some common misconception about anger – will power and method success through awareness – method of neutralisation of anger.

UNIT V: Eradication of Worries

Worry is a mental disease – Nature’s Law of cause and effect – factors beyond our control – How to deal with problems – analyse your problem and eradicate worry

Harmonious Relationships

Introduction – Three angles of life – The value of harmony in personal relations – Love and Compassion – pleasant face and loving words – appreciation and gratitude to parents and teachers – Bringing needed reforms in educational institutions
– Why should we serve others? Brotherhood – A scientific Basis for Universal Brotherhood protection of the environment – non-violence and the five fold moral culture.

**Text Book: Value Education for Health, Happiness and Harmony**  
(Based on the Philosophy and Teachings of Swami Vethanthiri Maharisi)  
Published By: Brain Trust, Aliyar A Wing of World Community Service Centre

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**SEMESTER – VI**  
(For those who joined in June 2008 and after)

<table>
<thead>
<tr>
<th>PART – V : Common Subject Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title : EXTENSION ACTIVITIES</td>
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<tr>
<td>Subject Code: <strong>EAUG61</strong></td>
</tr>
<tr>
<td>Sessional Marks: <strong>25</strong></td>
</tr>
</tbody>
</table>

**UNIT-I: Community Development-I:**
Definition – structure and composition – community based issues – need for awareness – Developmental Programmes.

**UNIT – II: Community Development–II:**

**UNIT – III: Volunteer Empowerment:**
Women’s Emancipation – formation of Youth Clubs – Self-Help Groups – Youth and Development

**UNIT – IV: Social Analysis:**

**UNIT – V: Introduction to NSS:**

(OR)

Civil Defence – Aid to civil authorities – Disaster management – Leadership – Man management – Adventure activities – Social service

**Reference:** National Service Scheme Manual (Revised), Ministry of Human Resources Development, government of India.
PART – III : Allied Subject

<table>
<thead>
<tr>
<th>Subject Code: 06AT01</th>
<th>Hours per week: 4</th>
<th>Credit: 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sessional Marks: 25</td>
<td>Summative Marks: 75</td>
<td>Total Marks: 100</td>
</tr>
</tbody>
</table>

Objectives:

- To learn about acoustics of buildings
- To know about elasticity, viscosity and Surface tension
- To get a knowledge in electricity and magnetism.
- To provide a good foundation in optics.

UNIT I: Waves and Oscillations

Simple Harmonic Motion – Composition of two Simple Harmonic Motions in a straight line- Composition of two Simple Harmonic Motions of equal time periods at right angles- Melde’s Experiment – Ultrasonics- production –application and uses- Reverberation – Absorption coefficient - Acoustics of buildings – factors affecting the acoustics of buildings- Sound distribution in an auditorium

UNIT II: Properties of Matter


Viscosity: Streamline flow and turbulent flow – Coefficient of viscosity - Derivation of Poiseulle’s formula.


UNIT III: Thermal Physics


Unit IV: Electricity and Magnetism

Unit V: Geometrical Optics


TEXT BOOK:
Unit I: 1.1 to 1.3, 1.9, 1.11 to 1.19.
Unit II: 2.1 to 2.7, 2.12, 2.14, 2.15, 2.17, 2.24, 2.29
Unit III: 3.15 to 3.21
Unit IV: 4.1, 4.4 to 4.6, 4.15 to 4.20
Unit V: 5.1, 5.2, 5.4, 5.6, 5.14, 5.16, 5.18 to 5.20, 5.22, 5.27

REFERENCE BOOKS:
1. Electricity and Magnetism - R. Murugeshan - Reprint with correction 2008
PART – III : Allied Subject

Subject Title: Allied Physics – II

<table>
<thead>
<tr>
<th>Subject Code: 06AT02</th>
<th>Hours per week: 4</th>
<th>Credit: 4</th>
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<tbody>
<tr>
<td>Sessional Marks: 25</td>
<td>Summative Marks: 75</td>
<td>Total Marks: 100</td>
</tr>
</tbody>
</table>

Objectives:

➢ To learn about Atomic and nuclear physics
➢ To know about elements of relativity
➢ To get a knowledge in electronics

UNIT I: PHYSICAL OPTICS


UNIT II: ATOMIC PHYSICS

Vector atom model – Quantum numbers associated with the vector atom model – the Pauli’s exclusion principle – magnetic dipole moment due to spin – the stern and gerlach experiment.

Unit III: NUCLEAR PHYSICS:

Models of nuclear structure – mass defect – binding energy – ionization chamber - nuclear fission-energy released in fission- atom bomb – Nuclear reactor – Nuclear fusion – Distinction between fission and fusion.

UNIT IV: ELEMENTS OF RELATIVITY


UNIT V: ELECTRONICS

Light Emitting Diode (LED) – Zener Diode- experiment to study the characteristics of the zener diode – zener diode as voltage regulator – Logic Gates – AND gate – OR gate- the NOT gate – the NAND gate –NAND gate is a universal gate- the NOR gate –NOR gate is universal gate – Boolean algebra – Postulates and theorem of Boolean algebra - De Morgan’s theorem.
TEXT BOOK:


Unit I: 6.2 to 6.4, 6.8, 6.10, 6.14, 6.19, 6.20
Unit II: 7.1, 7.2, 7.4, 7.7, 7.8
Unit III: 8.1, 8.3, 8.4, 8.6, 8.8, 8.9, 8.12, 8.13, 8.14
Unit IV: 10.1 to 10.4, 10.11 to 10.21
Unit V: 9.1 to 9.7, 9.9

REFERENCE BOOKS:

1. Electricity and Magnetism - R. Murugeshan - Reprint with correction 2008

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B.Sc. Mathematics & Chemistry Allied Physics CBCS Syllabus - SEMESTER – II
(For those who joined in June 2016 and after)

<table>
<thead>
<tr>
<th>PART – III : Allied Physics Practical</th>
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<tr>
<td>Subject Title : Allied Physics Practical</td>
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<tr>
<td>Subject Code: 06AP03</td>
</tr>
<tr>
<td>Sessional Marks: 40</td>
</tr>
</tbody>
</table>

(Any fourteen experiments)

1. Non-Uniform Bending – Pin and Microscope
2. Non-Uniform Bending – Optic lever
3. Uniform Bending – Pin and Microscope
4. Uniform Bending – Optic lever
5. Compound Pendulum
6. Torsion Pendulum
7. Sonometer – Verification of Laws (1st law & 2nd law)
8. Viscosity by Stoke’s method
9. Newton’s rings – Determination of Radius of curvature
10. Air wedge – Thickness of a paper
11. Spectrometer – Refractive Index
12. Spectrometer – Grating -Normal incidence
13. Carey Foster Bridge
14. Diode Characteristics
15. Zener Diode Characteristics
16. Logic Gates – AND, OR, NOT
CERTIFICATE COURSE - 1 - Even Semester  
(For those who joined in June 2016 and after)

<table>
<thead>
<tr>
<th>Subject Code:</th>
<th>Hours per week: 2</th>
<th>Credit: 2</th>
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<tbody>
<tr>
<td>Sessional Marks: 25</td>
<td>Summative Marks: 75</td>
<td>Total Marks: 100</td>
</tr>
</tbody>
</table>

### Objectives:
- To apply the knowledge of physics concept and ideas in day today life
- To inculcate the knowledge of handling electrical components and their usage
- To help the students for self employment

### UNIT I: POWER SUPPLIES

### UNIT II: ELECTRIC DEVICES – CONNECTING PROCEDURE, WORKING AND USES

### UNIT-III SWITCHES, PLUGS, TOPS (3 & 5 Amps)
One way, two way and three way switches – Plugs with two pin, three pin and five pin – Tops with two pin three pin.

### UNIT-IV LAMPS - CONNECTING PROCEDURE WORKING AND USES.
- Incandescent lamp with different watts – Fluorescent lamp (Tube light) - CFL(Compact Fluorescent Lamp) – LED lamp with different colours - Mercury and Sodium vapor lamps – Halogen lamps with Different colours.

### UNIT-V: SINGLE & THREE PHASE WIRING PROCEDURE WITH BLOCK DIAGRAM
Single phase wiring connection from main line to the house-Distribution connection to different locations of the house- Three phase connection from main line to the house - Distribution connection to different locations of the house by distributing three phase for three different locations – Advantages and disadvantages of Single and Three phase connections.

**TEXT BOOK:** Material prepared by Department of Physics

**REFERENCE BOOK:**
CERTIFICATE COURSE-2- Odd Semester
(For those who joined in June 2016 and after)

<table>
<thead>
<tr>
<th>Subject Title: MOBILE COMMUNICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Code:</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Objectives:
- To know about the fundamentals of mobile communication
- To help the students for their own mobile phone service centre
- To service minor & major handset problems

Unit I
Basic of mobile communication – use of tools & instruments used in mobile phone servicing – Details of various components used in mobile phones.

Unit II
Basic parts of mobile phones – Use of multimeter – Use of battery booster – Basic circuit board/ mother board introduction

Unit III
Assembling & disassembling of different types of mobiles phones – soldering & desoldering components using different soldering tools- names of different ICs – Work of different ICs

Unit IV
Working on SMD/BGA ICs and the PCB – fault finding and troubleshooting – Servicing procedure for fixing different hardware and advance faults

Unit V
Flashing – formatting –Unlocking – use of secret codes – downloading

TEXT BOOK:
Material prepared by Department of Physics, Vivekananda College