

**Sri Kaliswari College (Autonomous), Sivakasi**  
(Affiliated to Madurai Kamaraj University)

Re-Accredited with 'A' grade (CGPA 3.30) by NAAC)



**Programme Scheme, Scheme of Examination and Syllabi**

**(For those who join from June 2018 and afterwards)**

**Department of Physics**

# **U.G.Programme – Physics**

**Curriculum Design and Development Cell**

**Annexure M**

**Sri Kaliswari College (Autonomous), Sivakasi**

(Affiliated to Madurai Kamaraj University)

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**Programme Scheme, Scheme of Examination and Syllabi**

**(For those who join from June 2018 and afterwards)**

## **U.G. Programme - Physics**

**Curriculum Design and Development Cell**

**HOD**

**Dean of Science**

**Dean of**

**Principal**

**Academic Affairs**

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics  
Board of Studies Members**

| <b>S.No</b>                              | <b>Board Members</b>  | <b>Name and Designation</b>  |
|--|-----------------------|--|
| 1.                                       | Chairman of the Board | Mr.G.Krithiga Subramanian<br>Head, Department of Physics,<br>Sri Kaliswari College,<br>Sivakasi.   |
| 2.                                       | University Nominee    | Dr. M. Mohamed Ali Jinnah<br>Associate Professor of Physics,<br>MSS Wakf Board College,<br>Madurai- 625 020<br>Mobile No : 9486555620                                  |
| 3.                                       | Academic Expert 1     | Dr.B.Natarajan,<br>Assistant Professor,<br>Department of Physics<br>R.D. Govt. Arts College,<br>Sivagangai.<br>Mobile No: 9894186345                                   |
| 4.                                       | Academic Expert2      | Mr.M.Ramachandran M.Sc.,M.phil.,<br>Assistant Professor,<br>Department of Physics,<br>Arumugampillai Seethai Ammal College,<br>Thiruppattur.<br>Mobile No : 9363070089 |
| 5.                                       | Industrial Expert     | Mr.K.Prasath B.E., Dis.,<br>KJP Industrial Corporation,<br>30/9 West Car street, Vikram Plaza,<br>Sivakasi – 626123.<br>Mobile No: 9843022708.                         |
| 6.                                       | Alumnus               | Mr. T. Karuppasamy,<br>PG Assistant in Physics,<br>S.N.M.Kammavar School,<br>Sivakasi.<br>Mobile No: 9566578716  |
| <b>Faculty members in the Department</b> |                       |  |
| 7.                                       | Mr. T.Jeya Prakash    | Assistant Professor in Physics   |
| 8  | Ms. P.Shanthi         | Assistant Professor in Physics   |
| 9.                                       | Mrs.R.Nagarathinam    | Assistant Professor in Physics   |
| 10.                                      | Mr.J.Sivasankar       | Assistant Professor in Physics   |
| 11.                                      | Ms. R. Chitra         | Assistant Professor in Physics   |

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**B.Sc Physics (Semester) - (2018-2021)**  
**Objectives, Outcomes, Regulation**

**Programme Objectives:**

To enable the students of undergraduate Physics

- To understand the basic concepts in both Classical Physics and Modern Physics.
- To gather knowledge in Analog and Digital Electronics.
- To acquire the programming skills in the computer language C and ability to use personal computers.
- To update their knowledge on recent trends in Physics like nanotechnology
- To receive the necessary experimental skills in Physics.
- To enhance problem solving skills through science.

**Programme Outcomes:**

**Knowledge**

PO 1: Well grounded knowledge in chosen subjects.

PO 2: Updated knowledge related to the subjects.

**Skills**

PO 1: Acquisition of cognitive skills

PO 2: Acquisition of Life Skills for Employment.

**Attitude**

PO 1: Holistic Personality Development through Self-directed and lifelong learning.

PO 2: Eco Sensitivity, inclusive culture, moral uprightless and social commitment.

**Programmes Specific Outcomes:**

- Thorough knowledge of the core concepts in Physics
- Ability to design and conduct experiments, as well as to analyze and interpret data
- Trained to apply their Physics experience and knowledge to analyze new situations and problems in Physics
- Ability to apply core principles of Physics in post graduate Physics and modern areas of Physics research
- Be able to successfully pursue career objectives in a scientific career in government or private industry, in a teaching career, or in a related career

**Regulation:**

**Duration of the Programme:** Three years (Equivalent to six semesters)

**Eligibility:**

A pass in +2 examination conducted by the Board of the Higher Secondary Education Government of Tamilnadu with Physics and Mathematics as subjects or any other examination accepted by the syndicate as equivalents thereto are eligible to join this course.

**Medium of Instruction:** English

**Age Limit:**

Max age limit : 21 Years

**Age Relaxation:**

SC/ST/OBC/MBC/DNC & Women : 3 years age relaxation

Differently Abled Students : 5 years age relaxation

**Transitory Permission:**

Students joined from 2018 - 2021 may be permitted to write their examinations in this pattern up to April 2026.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**Choice Based Credit System**

**UG Programme – B.Sc**

**2018 - 2021**

**Scheme of Examination / Question Paper Pattern**

**Theory Examination**

The Internal and External marks should be allotted in the ratio 25:75.

**Internal Marks:**

|                     |  |
|---------------------|--|
| i. Test(3 Tests)    | : 15 Marks (Average of the best two tests) |
| ii. Assignment      | : 5 Marks (Average of two)                 |
| iii. Seminar / Quiz | : 5 Marks                                  |
| <b>Total</b>        | <b>: 25 Marks</b>                          |

**External Question Paper Pattern:**

The question paper for external exam will have three parts.

Time: 3 Hours

Max.Marks: 75

Part – A

(10 X 1 =10)

Question No.1 to 10 – All are Multiple Choices (2 Questions from Each Unit)

Part – B

(5 X 7 =35)

Choosing Either (a) or (b) Pattern (One Question from Each Unit)

- Question No. 11. (a) or 11. (b) - From Unit I  
12. (a) or 12. (b) - From Unit II  
13. (a) or 13. (b) - From Unit III  
14. (a) or 14. (b) - From Unit IV  
15. (a) or 15. (b) - From Unit V

Part – C

(3 X 10 =30)

Answer any Three out of Five Questions (One Question from Each Unit)

Question No. 16 – 20.

- 16 - From Unit I  
17 - From Unit II  
18 - From Unit III  
19 - From Unit IV  
20 - From Unit V

**Blue Print for Question Paper Setting**

| Component<br><br>Unit | Knowledge       |            |            | Understanding |                          |            | Higher objective |            |            | Total Marks |
|-----------------------|-----------------|------------|------------|---------------|--------------------------|------------|------------------|------------|------------|-------------|
|                       | PART A          | PART B     | PART C     | PART A        | PART B                   | PART C     | PART A           | PART B     | PART C     |             |
| UNIT I                | 1 (1)<br>2 (1)  |            |            |               | 11a<br>(7)               | 16<br>(10) |                  | 11b<br>(7) |            | 26          |
| UNIT II               | 3 (1)<br>4 (1)  | 12a<br>(7) |            |               |                          | 17<br>(10) |                  | 12b<br>(7) |            | 26          |
| UNIT III              | 6 (1)           | 13a<br>(7) |            |               | 13b<br>(7)               |            | 5 (1)            |            | 18<br>(10) | 26          |
| UNIT IV               | 8 (1)           |            | 19<br>(10) |               | 14a<br>(7)<br>14b<br>(7) |            | 7 (1)            |            |            | 26          |
| UNIT V                | 9 (1)<br>10 (1) | 15a<br>(7) |            |               | 15b<br>(7)               | 20<br>(10) |                  |            |            | 26          |
| Total                 | 8               | 21         | 10         |               | 35                       | 30         | 2                | 14         | 10         | 130         |

- Knowledge based - 30%
- Understanding - 50%
- Higher Objective - 20%

**Practical Examination**

Internal (Regular Practicals 30 + Record 10) = 40 Marks

Examination External = 60 Marks

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100 Marks

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**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**Choice Based Credit System – Curriculum Structure**

**UG Programme - B.Sc Physics**

**2018-2021**

| <b>Part</b>                   | <b>Subject</b>                    | <b>Sem I</b>                                 | <b>Sem II</b>                                  | <b>Sem III</b>                               | <b>Sem IV</b>                                  | <b>Sem V</b>   | <b>Sem VI</b>  | <b>Credits</b>           |
|-------------------------------|-----------------------------------|--|--|--|--|--|--|--------------------------|
| <b>I</b>                      | <b>Tamil/ Hindi</b>               | <b>6 (3)</b>                                 | <b>6 (3)</b>                                   | <b>6 (3)</b>                                 | <b>6 (3)</b>                                   | <b>--</b>  | <b>--</b>  | <b>12</b>                |
| <b>II</b>                     | <b>General English</b>            | <b>6 (3)</b>                                 | <b>6 (3)</b>                                   | <b>6 (3)</b>                                 | <b>6 (3)</b>                                   | <b>--</b>  | <b>--</b>  | <b>12</b>                |
| <b>III</b>                    | <b>Core Courses</b>               | <b>3 (3)</b><br><b>3 (3)</b><br><b>2P(-)</b> | <b>3 (3)</b><br><b>3 (3)</b><br><b>2P(1+2)</b> | <b>3 (3)</b><br><b>3 (3)</b><br><b>2P(-)</b> | <b>3 (3)</b><br><b>3 (3)</b><br><b>2P(2+2)</b> | <b>5 (5)</b><br><b>5 (5)</b><br><b>4 (4)</b><br><b>3P(-)</b><br><b>3P(-)</b> | <b>5 (5)</b><br><b>5 (5)</b><br><b>4 (4)</b><br><b>3P(3+3)</b><br><b>3P(3+3)</b> | <b>71</b>                |
|                               | <b>Allied Courses</b>             | <b>6 (5)</b>                                 | <b>6 (5)</b>                                   | <b>4 (3)</b><br><b>2P(2)</b>                 | <b>4 (3)</b><br><b>2P(2)</b>                   | <b>--</b>  | <b>--</b>  | <b>20</b>                |
|                               | <b>Optional Courses</b>           | <b>--</b>                                    | <b>--</b>                                      | <b>--</b>                                    | <b>4 (3)</b>                                   | <b>4 (3)</b>   | <b>4 (3)</b>   | <b>9</b>                 |
| <b>IV</b>                     | <b>Non-Major Elective Courses</b> | <b>2 (1)</b>                                 | <b>2 (1)</b>                                   | <b>--</b>                                    | <b>--</b>                                      | <b>--</b>  | <b>--</b>  | <b>2</b>                 |
|                               | <b>Skill Based Courses</b>        | <b>--</b>                                    | <b>--</b>                                      | <b>2 (2)</b>                                 | <b>--</b>                                      | <b>2 (1)</b><br><b>2 (1)</b>   | <b>2 (2)</b>   | <b>6</b>                 |
|                               | <b>Value Based Courses</b>        | <b>--</b>                                    | <b>--</b>                                      | <b>2 (1)</b>                                 | <b>--</b>                                      | <b>--</b>  | <b>2 (1)</b>   | <b>2</b>                 |
|                               | <b>Environmental Studies</b>      | <b>--</b>                                    | <b>--</b>                                      | <b>--</b>                                    | <b>--</b>                                      | <b>--</b>  | <b>2 (1)</b>   | <b>1</b>                 |
|                               | <b>Enrichment Courses</b>         | <b>2 (1)</b>                                 | <b>2 (1)</b>                                   | <b>--</b>                                    | <b>--</b>                                      | <b>--</b>  | <b>--</b>  | <b>2</b>                 |
|                               | <b>Disaster Management</b>        | <b>--</b>                                    | <b>--</b>                                      | <b>--</b>                                    | <b>--</b>                                      | <b>1(1)</b>  | <b>--</b>  | <b>1</b>                 |
|                               | <b>Value Education</b>            | <b>--</b>                                    | <b>--</b>                                      | <b>--</b>                                    | <b>--</b>                                      | <b>1(1)</b>  | <b>--</b>  | <b>1</b>                 |
| <b>V</b>                      | <b>Extension</b>                  | <b>--</b>                                    | <b>--</b>                                      | <b>--</b>                                    | <b>(1)</b>                                     | <b>--</b>  | <b>--</b>  | <b>1</b>                 |
| <b>Total Hours (per week)</b> |                                   | <b>30</b>                                    | <b>30</b>                                      | <b>30</b>                                    | <b>30</b>                                      | <b>30</b>  | <b>30</b>  | <b>140</b><br><b>180</b> |



**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**Choice Based Credit System - Curriculum Pattern**

**UG Programme - B.Sc**

**2018-2021**

| <b>Semester</b> | <b>Part</b> | <b>Course Code</b> | <b>Course Name</b>  | <b>Hours</b> | <b>Credits</b> |
|-----------------|-------------|--------------------|---|--------------|----------------|
| <b>I</b>        | I           | 18UTAL11           | <b>Tamil/Hindi - I</b>  | 6            | 3              |
|                 | II          | 18UENL11           | <b>General English – I</b>  | 6            | 3              |
|                 | III         | 18UPHC11           | <b>Core Course– I :</b> Foundation Course: Basic Physics                | 3            | 3              |
|                 |             | 18UPHC12           | <b>Core Course – II :</b> Properties of Matter                          | 3            | 3              |
|                 |             |                    | Major Physics Practical-I   | 2            | -              |
|                 |             | 18UPHA11           | <b>Allied Course– I :</b> Mathematics – I                               | 6            | 5              |
|                 | IV          | 18UPHN11           | <b>Non - Major Elective Course- I :</b> Physics in Everyday Life – I    | 2            | 1              |
|                 |             | 18UPHE11           | <b>Enrichment Course – I :</b> Introduction to PC Software              | 2            | 1              |
|                 |             | <b>Total</b>       | <b>30</b>   | <b>19</b>    |                |
| <b>II</b>       | I           | 18UTAL21           | <b>Tamil/Hindi - II</b>   | 6            | 3              |
|                 | II          | 18UENL21           | <b>General English – II</b>   | 6            | 3              |
|                 | III         | 18UPHC21           | <b>Core Course – III :</b> Mechanics and Sound                          | 3            | 3              |
|                 |             | 18UPHC22           | <b>Core Course – IV :</b> Gravitation and Relativity                    | 3            | 3              |
|                 |             | 18UPHC2P           | <b>Core Course –V :</b> Major Physics Practical–I                       | 2            | 1+2            |
|                 |             | 18UPHA21           | <b>Allied Course – II :</b> Mathematics – II                            | 6            | 5              |
|                 | IV          | 18UPHN21           | <b>Non - Major Elective Course – II :</b> Physics in Everyday Life - II | 2            | 1              |
|                 |             | 18UPHE21           | <b>Enrichment Course – II :</b> Photography                             | 2            | 1              |
|                 |             | <b>Total</b>       | <b>30</b>   | <b>22</b>    |                |

|     |          |  |  |           |        |
|-----|----------|--|--|-----------|--------|
| III | I        | 18UTAL31   | <b>Tamil/Hindi - III</b>   | 6         | 3      |
|     | II       | 18UENL31   | <b>General English – III</b>   | 6         | 3      |
|     | III      | 18UPHC31   | <b>Core Course – VI</b> : Optics   | 3         | 3      |
|     |          | 18UPHC32   | <b>Core Course – VII</b> : Electricity and Electromagnetism                            | 3         | 3      |
|     |          | 18UPHA31   | Major Physics Practical – II   | 2         | -      |
|     |          | 18UPHA3P   | <b>Allied Course – III :</b><br>Allied Chemistry – I<br>Allied Chemistry Practical – I | 4<br>2    | 3<br>2 |
|     | IV       | 18UPHS31   | <b>Skill Based Course – I</b> : Thermal Physics  | 2         | 2      |
|     | 18UPHV31 | <b>Value Based Course – I :</b><br>Physics of Household Appliances – I | 2  | 1         |        |
|     |          | <b>Total</b>   | <b>30</b>  | <b>20</b> |        |
| IV  | I        | 18UTAL41   | <b>Tamil/Hindi - IV</b>  | 6         | 3      |
|     | II       | 18UENL41   | <b>General English – IV</b>  | 6         | 3      |
|     | III      | 18UPHC41   | <b>Core Course – VIII</b> :Mathematical Physics  | 3         | 3      |
|     |          | 18UPHC42   | <b>Core Course-IX:</b> Spectroscopy and Laser Physics                                  | 3         | 3      |
|     |          | 18UPHC4P   | <b>Core Course - X</b> : Major Practical – II  | 2         | 2+2    |
|     |          |  | <b>Allied Course – IV :</b>  |           |        |
|     |          | 18UPHA41   | Allied Chemistry - II  | 4         | 3      |
|     |          | 18UPHA4P   | Allied Chemistry Practical -II   | 2         | 2      |
|     |          |  | <b>Optional / Elective Course – I :</b>  | 4         | 3      |
|     |          | 18UPHO41<br>18UPHO42   | 1.Programming in C<br>2. Consumer Affairs  |           |        |
| V   |          | <b>Extension</b>   | -  | 1         |        |
|     |          | <b>Total</b>   | <b>30</b>  | <b>25</b> |        |

|          |     |                            |   |           |     |
|----------|-----|----------------------------|---|-----------|-----|
| V        | III | 18UPHC51                   | <b>Core Course – XI : Atomic Physics and Quantum Mechanics</b>        | 5         | 5   |
|          |     | 18UPHC52                   | <b>Core Course – XII : Analog Electronics</b>                         | 5         | 5   |
|          |     | 18UPHC53                   | <b>Core Course – XIII : Classical Mechanics</b>                       | 4         | 4   |
|          |     |                            | Major Physics Practical - III   | 3         | -   |
|          |     |                            | Major Physics Practical – IV  | 3         | -   |
|          |     |                            | <b>Optional / Elective Course – II</b>                                | 4         | 3   |
|          |     | 18UPHO51                   | 1. Optoelectronics  |           |     |
|          |     | 18UPHO52                   | 2. Statistical Mechanics  |           |     |
|          | IV  | 18UPHS51                   | <b>Skill Based Course – II : Medical Physics</b>                      | 2         | 1   |
|          |     | 18UPHS52                   | <b>Skill Based Course - III : Energy Physics-I</b>                    | 2         | 1   |
| 18UVED51 |     | <b>Value Education</b>     | 1   | 1         |     |
| 18UDMG51 |     | <b>Disaster Management</b> | 1   | 1         |     |
|          |     | <b>Total</b>               | <b>30</b>   | <b>21</b> |     |
| VI       | III | 18UPHC61                   | <b>Core Course – XIV : Condensed Matter Physics</b>                   | 5         | 5   |
|          |     | 18UPHC62                   | <b>Core Course – XV : Nuclear Physics</b>                             | 5         | 5   |
|          |     | 18UPHC63                   | <b>Core Course – XVI : Digital Electronics</b>                        | 4         | 4   |
|          |     | 18UPHC6P                   | <b>Core Course - XVII : Major Physics Practical – III</b>             | 3         | 3+3 |
|          |     | 18UPHC6Q                   | <b>Core Course - XVIII : Major Physics Practical - IV</b>             | 3         | 3+3 |
|          |     |                            | <b>Optional / Elective Course – III</b>                               | 4         | 3   |
|          |     | 18UPHO61                   | 1. Nanotechnology and Instrumentation                                 |           |     |
|          |     | 18UPHO62                   | 2. Microprocessor Fundamentals  |           |     |
|          | IV  | 18UPHV61                   | <b>Value Based Course – II : Physics of Household Appliances – II</b> | 2         | 1   |
|          |     | 18UPHS61                   | <b>Skill Based Course - IV : Energy Physics – II</b>                  | 2         | 2   |
| 18UESR61 |     | Environmental Studies      | 2   | 1         |     |
|          |     | <b>Total</b>               | <b>30</b>   | <b>33</b> |     |

Extra Credit Courses:

| <b>Semester</b> | <b>Course Code</b> | <b>Title</b>                          | <b>Hours</b> | <b>Credits</b> |
|-----------------|--------------------|---------------------------------------|--------------|----------------|
| III             | 18UPHEX1           | Electricity and Electrical Appliances | 4            | 2              |
| IV              | 18UPHEX2           | Applied Physics                       | 4            | 2              |

| <b>Semester</b> | <b>I</b>  | <b>II</b> | <b>III</b> | <b>IV</b> | <b>V</b>  | <b>VI</b> |
|-----------------|-----------|-----------|------------|-----------|-----------|-----------|
| <b>Credits</b>  | <b>19</b> | <b>22</b> | <b>20</b>  | <b>25</b> | <b>21</b> | <b>33</b> |

Dean of Science

Dean of Academic Affairs

Principal

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester I**  
**(2018-2021)**

**Core Course -I: Foundation Course - Basic Physics (18UPHC11)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 3</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 45 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To understand the basic concept of vector and its applications.
- To understand the basic concepts of wave motion.
- To recollect the concepts in heat and thermodynamics.
- To be familiar with electric field, flux and potential.
- To understand electric current and electric circuits.

**Course Outcomes:**

1. Acquire knowledge in the basic concepts of Basic Physics.
2. Familiarize with vectors and various vector operations.
3. Gain knowledge in Newton's laws of motion and wave motion.
4. Understand the basic concepts of thermal physics and electrostatics.
5. Acquire skill in electric current and solving simple circuits.

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**UNIT I** **(9 hrs)**

**Vector Concepts and their Uses :** Introduction – Vectors and Scalars – Adding Vectors Geometrically – Components of Vectors – UNIT Vectors – Adding Vectors by Components – Multiplying Vectors – Moving in two or Three Dimensions - Position and Displacement – Average Velocity and Instantaneous Velocity – Average Acceleration and Instantaneous Acceleration – Newton's I Law – Force – Mass – Newton's II Law – Newton's III Law .

**UNIT II** **(9 hrs)**

**Wave Motion:** Waves – Types of Waves – Transverse and Longitudinal Waves – Wavelength and Frequency – The Speed of the Traveling Waves – Wave Speed on a Stretched String – The Principles of Superposition of Waves – Interference of Waves – Standing Waves.

**UNIT III** **(9 hrs)**

**Heat and Thermodynamics:** Introduction – Zeroth Law of Thermodynamics – Measuring Temperature - Centigrade and Fahrenheit Scales – Thermal Expansion – Temperature and Heat – Absorption of Heat by Solids and Liquids – First Law of Thermodynamics – Some Special Cases of First Law of Thermodynamics – Heat Transfer Mechanism.

**18UPH01**

**UNIT IV****(9 hrs)**

**Electrostatic Field and Potential:** Introduction – Electric charge – Conductors and Insulators – Coulomb’s Law – Charge is Quantized – Charge is Conserved – Electric Field – Electric Field Lines – Electric Field Due to a Point Charge – Flux – Flux of an Electric Field –

Electric Potential – Equipotential Surfaces – Calculating the Potential from the Field – Potential Due to a Point Charge.

**UNIT V****(9 hrs)**

**Electric Current and Circuits:** Moving Charges and Electric Currents – Electric Current – Current Density – Resistance and Resistivity – Ohm’s Law – Power in Electric Circuits – Work, Energy and emf - Calculating the Current in a Single Loop Circuit – Other Single Loop Circuits – Potential Differences – The Ammeter and Voltmeter (Measurement only).

**Text Book:**

Halliday, Resnick and Jearl Walker Extended, “Principles of Physics”, Wiley India Pvt. Ltd, Ninth Edition, Reprint 2012.

| Unit | Chapter | Section                        | Page No.                        |
|------|---------|--------------------------------|---------------------------------|
| I    | 3       | 3.2 -3.6, 3.8                  | 38 - 44                         |
|      | 4       | 4.2 -4.4                       | 59 – 63                         |
|      | 5       | 5.2 -5.6 ,5.8                  | 87 - 92 , 98 – 99               |
| II   | 16      | 16.2 -16.6, 16.9, 16.10, 16.12 | 411 – 421, 425 – 427, 431 - 432 |
| III  | 18      | 18.2 - 18.8 ,18.10 -18.12      | 476 – 487 , 491 - 497           |
| IV   | 21      | 21.2 -21.6                     | 561 – 573                       |
|      | 22      | 22.2 - 22.4                    | 580 – 581                       |
|      | 23      | 23.2 - 23.3                    | 605 – 607                       |
|      | 24      | 24.3 -24.6                     | 629 – 633 , 635                 |
| V    | 26      | 26.2 -26.5, 26.7               | 682 – 692 , 695                 |
|      | 27      | 27.3 -27.6, 27.8               | 706 – 712 ,720                  |

**Reference Books:**

1. D.S. Mathur ,Dr.P.S.Hemne, “Mechanics”, S.Chand and Company Pvt., Ltd., Revised Edition, 2012.
2. Brijlal N.Subramanyam, P.S. Hemne “Heat and thermodynamics”, S. Chand and Company LTD, New Delhi Revised edition (2010) Reprint 2012.
3. R.Murugasen,“Electricity and Magnetism”, S.Chand and Company Pvt., Ltd., Delhi, 9<sup>th</sup> Revised Edition, 2014.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester I**  
**(2018-2021)**

**Core Course - II: Properties of Matter (18UPHC12)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int.Marks</b>  | <b>:25</b>   |
| <b>Hours/Week</b> | <b>: 3</b>      | <b>Ext.Marks</b>  | <b>:75</b>   |
| <b>Duration</b>   | <b>: 45 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To be familiar with different moduli of elasticity and their measurements.
- To understand the basic concepts of liquid flow of non viscous liquids.
- To understand the phenomenon of surface tension.
- To give an exposure on diffusion and osmosis.
- To be aware of laws of flotation and their applications.

**Course Outcomes:**

1. Able to distinguish between the different forces that hold atoms together.
2. Understand the elastic properties of solids.
3. Gain knowledge on the basic concept of capillarity and its applications.
4. Acquire knowledge in Bernoulli's theorem will helps to understand the working of flying object like aeroplanes etc.
5. Enable to solve problems in properties of matter.

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**UNIT I** **(9 hrs)**

**Elasticity:** Elasticity – Different Moduli of Elasticity – Work Done in a Strain - Behaviour of a Wire Under Progressive Tension - Relation between the Elastic Moduli - Determination of Poisson's Ratio for Rubber - Torsion of a Body - Torsional Oscillations of a Body - Rigidity Modulus by Torsion Pendulum - Bending of Beams - Expression for Bending Moment - Measurement of Young's Modulus by Bending of a Beam.

**UNIT II** **(9 hrs)**

**Fluid Motion:** Introduction – Stream Line Flow and Turbulent Flow – Poiseuille's Formula for the Flow of a Liquid through Capillary Tube – Poiseuille's Method for Determining Coefficient of Viscosity of a Liquid - Ostwald's Viscometer - Terminal Velocity and Stoke's Formula - Stoke's Method for the Coefficient of Viscosity of a Viscous Liquid - Equation of Continuity – Bernoulli's Theorem and its Application (Venturimeter and Carburettor).

**UNIT III** **(9 hrs)**

**Surface Tension:** Introduction – Explanation of Surface Tension on kinetic Theory - Workdone in Increasing the Area of a Surface - Angle of Contact - Spreading of One Liquid Over Another - Pressure Difference across a Liquid Surface - Excess Pressure Inside a Curved

**18UPH03**

Liquid Surface - Force between Two Plates Separated by a Thin Layer of a Liquid – Experimental Determination of Surface tension by Jaeger’s method.

**UNIT IV** **(9 hrs)**

**Diffusion and Osmosis:** Diffusion – Fick’s Laws of Diffusion - Experimental Determination of Coefficient of Diffusion- Graham’s Law of Diffusion of Gases - Effusion of Gases - Transpiration – Osmosis - Experimental Determination of Osmotic Pressure - Laws of Osmotic Pressure - Osmosis and Vapour Pressure of a Solution - Osmosis and Boiling Point of a Solution - Osmosis and Freezing Point of a Solution.

**UNIT V** **(9 hrs)**

**Hydrostatics:** Fluids – Hydrostatic Pressure – Hydrostatic Pressure due to a Liquid Column – Pascal’s Law – Thrust on an Immersed Plane – Centre of Pressure – Principle of Archimedes - Equilibrium of Floating Bodies – Stability of Equilibrium – Rolling and Pitching of a Ship – Determination of Metacentric Height.

**Text Books:**

1. R.Murugesan, “Properties of Matter”, Eurasia S.Chand and company (Pvt) Ltd, New Delhi, Revised Edition, 2008.
2. Brijlal, N.Subrahmanyam , “Properties of matter”, S.Chand and Company Ltd, New Delhi, First edition, Reprint 2003.
3. D.S. Mathur, “Elements of Properties of Matter”, S.Chand and Company Ltd, New Delhi, Eleventh Edition.

| Unit | Text Book No. | Chapter | Section                      | Page No.                    |
|------|---------------|---------|------------------------------|-----------------------------|
| I    | 1             | 1       | 1.1 - 1.9, 1.13 - 1.15, 1.21 | 1 - 13, 19 - 25, 33 – 36    |
| II   | 1             | 2       | 2.1 - 2.6, 2.8-2.9           | 45 - 51, 56 – 57            |
|      | 2             | 7       | 7.3, 7.5, 7.7 (1,5)          | 237, 238 - 240, 241,242,244 |
| III  | 1             | 3       | 3.1-3.3, 3.6-3.11            | 70 - 73, 75 - 84            |
| IV   | 1             | 4       | 4.1 - 4.6, 5.1 - 5.6         | 98 - 101, 102 - 108         |
| V    | 3             | 9       | 9.1 - 9.7, 9.10 - 9.14       | 327 - 332, 335 - 339        |

**Reference Books:**

1. P.K.Chakrabarti, “Mechanics and General Properties of Matter”, Books and Allied (PVT) Limited, Calcutta, Third Edition, 2009.
2. D.S. Mathur, Revised by Dr.P.S. Hemne, “Mechanics”, S .Chand and Company (PVT) Limited, Revised Edition 2012, Reprint 2014.



**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme**

**Semester I**

**(2018-2021)**

**Non –Major Elective Course- I : Physics in Everyday Life - I (18UPHN11)**

**(For those who join from June 2018 and afterwards)**

**Credit : 1**

**Int.Marks : 25**

**Hours/Week : 2**

**Ext. Marks : 75**

**Duration : 30 hrs**

**Max. Marks : 100**

**Course Objectives:**

- To enable the students to understand the basic concepts of heat and applications.
- To learn about different light sources and energy saving methods.
- To understand the basic concepts in Electricity.
- To understand the working of some electrical appliances.
- To get an exposure on solar energy and its uses.

**Course Outcomes:**

1. Understand and solve the simple problems in thermal physics.
2. Gain knowledge on the working of filament and CFL lamps.
3. Able to solve simple problem based on ohm's law.
4. Gain awareness on need for renewable energy resources.

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**UNIT I**

**(6 hrs)**

Heat and Temperature – Measurement of Temperature – Fuels – Burner – Electric Heater – Induction Stove – Microwave Oven.

**UNIT II**

**(6 hrs)**

Light – Sources – Spectrum – Atom – Molecules – Solids – Filament Lamp – Tube Light – CFL – Energy Savings Methods.

**UNIT III**

**(6 hrs)**

Electricity – Current – Voltage – Power – Energy – Conductor – Insulator – Resistor – Ohm's Law – Capacitors – Inductors.

**UNIT IV**

**(6 hrs)**

Primary Cells – Secondary Cells – DC to AC Converter – Transformer – DC Motor – Universal Motor – Uses of Motor.

**UNIT V**

**(6 hrs)**

Need for Renewable Energy Resources and their Importance – Introduction to Solar Energy – Measurement of Solar Radiation Data– Flat Plate Collector – Solar Cell – Solar Cooker – Solar Water Heater .

**Text Book:**

Study material prepared by Department of Physics, Sri Kaliswari College, Sivakasi.

| <b>Unit</b> | <b>Chapter</b> | <b>Section</b> | <b>Page No.</b> |
|-------------|----------------|----------------|-----------------|
| I           | 1              | 1.1 - 1.7.5    | 1 - 11          |
| II          | 2              | 2 - 2.9.3      | 12 - 22         |
| III         | 3              | 3 - 3.10       | 24 - 31         |
| IV          | 4              | 4.1- 4.7       | 32 - 38         |
| V           | 5              | 5 - 5.7.3      | 39 - 45         |

**Reference Books:**

1. N. Premkumar, "Basic Electrical Electronics and Computer Engineering", Anuradha Agencies Publishers, Kumbakonam, Second Edition, 1995.
2. B.K.Khan , "Non –Conventional Energy Resources" ,Tata Mc Graw hill, 2006.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester I**  
**(2018-2021)**

**Enrichment Course - I: Introduction to PC Software (18UPHE11)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credit</b>     | <b>: 1</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 2</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 30 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To enable the students to make use of computer to create and store text files in windows Environment.
- To guide the students to make use of various options in MS Word.
- To make the students to understand the mail merge.
- To enable the students to make use of Excel functions for scientific applications.
- To enable the students to prepare charts using Excel worksheet.

**Course Outcomes:**

1. Acquire the skill to use the various option in MS Word.
2. Develop to create the mail merge document.
3. Apply the Excel function for scientific application.
4. Gain knowledge in preparing charts using excel worksheet.

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**UNIT I** **(6 hrs)**

MS-Word Introduction – Creating and Saving Documents - Page Setup – Editing a Document - Printing a Document - Find and Replace.

**UNIT II** **(6 hrs)**

Viewing Document in Different Ways - Header and Footer - Inserting Page Number – Inserting Pictures, Inserting Text Box and WordArt – Format Menu and its Uses.

**UNIT III** **(6 hrs)**

Tools Menu – Spelling and Grammar – Mail Merge – Table Menu – Inserting Table – Editing the Contents of the Table.

**UNIT IV** **(6 hrs)**

Explanation for an Excel Page (rows, columns and cells) - Entering Data - Usage of Formulae and Functions.

**UNIT V** **(6 hrs)**

Creating an Excel Chart - Data Manipulation - Types of Functions.

**Text Book:**

S.David Laurence, “MS OFFICE”, JDP Publications, Rajapalayam, First Edition, 2008.

| <b>Unit</b> | <b>Chapter</b> | <b>Page No.</b> |
|-------------|----------------|-----------------|
| I           | 1,2            | 1-23            |
| II          | 3              | 24-46           |
| III         | 4              | 47-61           |
| IV          | 5              | 62-72           |
| V           | 6              | 72-93           |

**Reference Books:**

1. Raghav Bahl , “Exploring Microsoft XP”, Cyber Tech Publication New Delhi, First Edition, 2001.
2. Vikas gupta , “Comdex Computer Course kit (XP Edition)”, Dream tech Publishers, 2007.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester II**  
**(2018-2021)**  
**Core Course - III : Mechanics and Sound ( 18UPHC21)**  
**(For those who join from June 2018 and afterwards)**

**Credits :3**

**Hours/Week :3**

**Duration :45 hrs**

**Int.Marks :25**

**Ext. Marks :75**

**Max. Marks :100**

**Course Objectives:**

- To understand the concepts of conservation laws.
- To acquire the knowledge of moment of inertia of solid objects.
- To understand the concepts of collision.
- To evaluate the velocity of sound in different media.
- To be disseminate with reflection of sound and ultrasonic waves.

**Course Outcomes:**

1. Gain knowledge on the basic concepts of mechanics and sound.
2. Acquire knowledge in conservation of energy under conservative and non- conservative forces.
3. Able to calculate moment of inertia for different objects.
4. Acquire knowledge on different types of collision and loss energy in different types of collision.
5. Understand the concepts related to velocity of sound in different media and Doppler effect.
6. Understand the theory of reflection of sound and various application of Ultrasonic waves .

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**UNIT I**

**(9 hrs)**

**Conservation Laws:** Concept of Work, Power and Energy – Conservative Force – Work Energy Principle – Conservative Force as Negative Gradient of Potential Energy  $curl \vec{F} = 0$  – Law of Conservation of Mechanical Energy – Non-Conservative Force – General Law of Conservation of Energy - Conservation of Momentum for a System of Particles.

**UNIT II**

**(9 hrs)**

**Moment of Inertia:** Rigid Body – Rotational and Translational Motion - Moment of Inertia – Radius of Gyration – Parallel axes Theorem and Perpendicular Axes Theorem of Moment of Inertia (for Plane Lamina Body Only) – Moment of Inertia of Uniform Rod – Moment of Inertia of a Rectangular Lamina – Moment of Inertia of a Circular Lamina or Disc – Moment of Inertia of a Solid Cylinder – Moment of Inertia of Solid Sphere.

**18UPH09**

**UNIT III****(9hrs)**

**Collision:** Impulse of a Force - Collision – Elastic and In-elastic Collision – Oblique Impact of a Smooth Sphere on a Fixed Smooth Plane – Elastic One Dimensional Collision - Direct Impact of Two Smooth Spheres – Loss of Kinetic Energy Due to Direct Impact of Two Smooth Spheres – Oblique Impact of Two Smooth Spheres - Loss of Kinetic Energy Due to Oblique Impact of Two Smooth Spheres.

**UNIT IV****(9 hrs)**

**Velocity of Sound in Media and Doppler Effect:** Sound – Velocity of Longitudinal Waves in Gases – Newton’s Formula for Velocity of Sound and Laplace Correction ( Theory only no Derivation)- Factors Affecting Velocity of Sound – Velocity of Sound in Water – Velocity Sound in Air – Velocity of Sound in Isotropic Solid – Doppler Effect in Sound.

**UNIT V****(9 hrs)**

**Reflection of Sound and Ultrasonic Waves:** Reflection of Plane Wave at a Plane Surface - Experimental Demonstration of Reflection of Sound - Echo - Application of Reflection of Sound- Phase Change Due to Reflection - Acoustics - Reverberation- Factors Affecting Acoustics of Building - Requisites of Good Acoustics - Ultrasonic – Production and Detection of Ultrasonic Waves – Applications of Ultrasonic Waves.

**Text Books:**

1. D.S. Mathur ,Dr.P.S.Hemne, “Mechanics”, S.Chand and Company Ltd., Revised Edition, 2012.
2. R.Murugesan, “Mechanics and Relativity - Properties of Matter ”,Vivekananda Press, Madurai, First Edition 2006.
3. N. Subramanyam and Brij lal, “Text Book of Sound”, Vikas Publishing House Pvt,, Ltd., Second Revised Edition, reprint 2002.

| Unit | Text Book No. | Chapter | Section   | Page No.                            |
|------|---------------|---------|---|-------------------------------------|
| I    | 1             | 5       | 5.2 – 5.6, 5.10   | 227-234,251                         |
|      |               | 6       | 6.1   | 257-259                             |
| II   | 1             | 11      | 11.1, 11.4, 11.5,<br>1.7,11.9.1,11.9.2,<br>11.9.4,11.9.5 11.9.6,<br>11.9.10 | 562-563,567-569,570-<br>579,582-583 |
| III  | 2             | 4       | 4.1 – 4.7   | 87,90-93,97-100,102-<br>105         |
| IV   | 3             | 5       | 5.1 – 5.4,5.8-5.12  | 91-95,100-104,                      |
|      |               | 8       | 8.1 –8.6  | 181-186                             |
| V    | 3             | 9       | 9.1-9.8   | 201-209                             |
|      |               | 10      | 10.14,10.15,10.20–10.25,<br>10.27   | 237-238,257-259,259-<br>264,268-270 |

**Reference Books:**

1. P.Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam, “Mechanics”, S.Chand and Company Ltd., Sixth revised edition, Reprinted on 2014.
2. M. Ghosh and D. Bhattacharya, “Oscillations, Waves and Acoustics”, S.Chand and Company Ltd., Third Edition, 2006.

**Sri Kaliswari College (Autonomous) , Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester II**  
**(2018 - 2021)**  
**Core Course -IV: Gravitation and Relativity (18UPHC22)**  
**(For those who join from June 2018 and afterwards)**

**Credits : 3**

**Int. Marks : 25**

**Hours/Week : 3**

**Ext. Marks : 75**

**Duration : 45 hrs**

**Max. Marks : 100**

**Course Objectives:**

- To study the basic concepts of Newton's law of gravitation.
- To give an exposure on variation of  $g$ .
- To be familiar with the satellites and rocket motion.
- To give an introduction of special theory of relativity.
- To have an exposure on the mass – energy equivalence.

**Course Outcomes:**

1. Able to solve problems in gravitation and relativity.
2. Get familiarity in planetary motion and law governing the planetary motion.
3. Gain knowledge in the basic concepts of rocket and satellite motion.
4. Understand the basic difference Newton Relativity & Einstein's relativity.

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**UNIT I**

**(9 hrs)**

Basic Forces in Nature - Newton's Law of Gravitation – Experimental Determination of the Gravitational Constant – Cavendish's Method – Boy's Method – Density of the Earth – Mass of the Earth and the Sun – Gravitational Field - Gravitational Potential and the Gravitational Potential Energy – Gravitational Field and Potential Due to a Spherical Shell.

**UNIT II**

**(9 hrs)**

Motion of Falling Bodies – Kepler's Laws of Motion and Derivation of Law of Gravitation – Acceleration Due to Gravity - Simple Pendulum – Compound Pendulum – Value of  $G$  at the Poles and at the Equator - Variation of ' $g$ ' with Altitude, Depth and Rotation – Difference between Mass and Weight – Inertial Mass and Gravitational Mass.

**UNIT III**

**(9 hrs)**

Satellites – Orbital Velocity – Stationary Satellite – Escape Velocity – Time Period of the Satellite - Jet Planes - Principle and Theory of Rocket – Velocity of Rocket at Any Instant – Rocket Propulsion System – Specific Impulse - The Multistage Rocket - Shape of the Rocket – Uses of the Artificial Satellite.

**UNIT IV**

**(9 hrs)**

Frame of Reference - Newton's Laws of Motion and Their Limitations - Inertial Frame of Reference - Non-Inertial Frame of Reference – Galilean Transformation – Galilean Invariance –



Michelson and Morley Experiment - Einstein's Concept of Relativity – Postulates of Special Theory of Relativity.

**UNIT V**

**(9 hrs)**

Lorentz Transformation – Length Contraction - Time Dilation - Velocity Addition – Simultaneity - Equivalence of Mass and Energy – Transformation of Relativistic Momentum and Energy – Relation between Relativistic Momentum and Energy – Relation between the Total Energy , Rest Mass Energy and Momentum.

**Text Books:**

1. D.S. Mathur “Mechanics”, S .Chand and Company, First Edition, 2003.
2. Brijlal and N.Subramanyam, “Properties of Matter”, Revised Edition, Eurasia Publishing House (Pvt) Ltd, New Delhi, Reprint 2003.
- 3 .R.Murugesan, “Mechanics, Properties of Matter, and Sound, Thermal Physics”, Vivekananda press, Madurai, First Edition, 2002.

| Unit | Text Book No. | Chapter | Section  | Page No.                           |
|------|---------------|---------|--|------------------------------------|
| I    | 1             | 11      | 11.1, 11.2, 11.3. 1, 11.3.2, 11.4, 11.5, 11.7, 11.8, 11.13 | 582 – 591, 595 – 598, 602 – 605    |
| II   | 2             | 5       | 5.1 – 5.3, 5.9 – 5.11, 5.16 – 5.21                         | 123 – 125, 138 – 143, 152 – 156    |
| III  | 2             | 5       | 5.29 – 5.31, 5.35  | 166 – 171, 177                     |
|      | 3             | 2       | 2.1 – 2.7  | 30 – 36                            |
| IV   | 1             | 2       | 2.3, 2.4, 2.5, 2.6, 2.8, 2.11. 3.3, 3.4, 3.5               | 63 – 69, 80 – 83, 69 – 72, 75 – 77 |
|      |               | 3       | 3.3, 3.4, 3.5  | 100 – 107                          |
| V    | 1             | 3       | 3.6, 3.7(i, ii, iii, v), 3.9, 3.10, 3.12, 3.13             | 107 – 121, 135 – 139, 140 – 141    |

**Reference Books:**

1. D.S. Mathur, “Elements of Properties of matter”, S Chand and Company, FirstEdition, 2006.
2. Cutnell Johnson, “Physics”, John Wiley and Sons, Inc, Fifth Edition, 2004.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester I and II**  
**(2018 - 2021)**

**Core Course -V: Major Physics Practical –I (18UPHC2P)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |             |
|-------------------|-----------------|-------------------|-------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int. Marks</b> | <b>: 40</b> |
| <b>Hours/Week</b> | <b>: 2+2</b>    | <b>Ext. Marks</b> | <b>: 60</b> |
| <b>Duration</b>   | <b>: 60 hrs</b> | <b>Max. Marks</b> | <b>:100</b> |

**Course Objectives:**

- To determine the Young's modulus of the given material.
- To determine the gravitational constant.
- To determine the viscosities of different liquids.
- To calibrate the given ammeter and voltmeter.
- To find the resistivity of the material and its temperature coefficient of resistance.

**Course Outcomes:**

1. Ability to determine the Young's modulus of different materials.
2. Able to calculate gravitational constant at different places.
3. Familiar with measuring viscosities of different liquids.
4. Able to calibrate voltmeter and ammeter of different ranges.
5. Capable of determining the resistivity of different materials.
6. Able to calculate the frequency of AC supply.

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1. Young's Modulus – Uniform bending – Pin & Microscope Method.
  2. Young's Modulus – Non Uniform Bending - Optic Lever Method.
  3. Young's Modulus - Cantilever – Depression by Pin and Microscope.
  4. Young's Modulus Non-uniform Bending – Pin and Microscope
  5. Torsion Pendulum - Determination of G and I.
  6. Sonometer – Verification of Laws.
  7. Compound Pendulum - Determination of g.
  8. Spectrometer – Refractive Index of the Prism (sodium vapor lamp).
  9. Comparison of Viscosities – Ostwald's Viscometer.
  10. Potentiometer – Low Range Voltmeter Calibration.
  11. Potentiometer – Ammeter Calibration.
  12. Potentiometer – High range Voltmeter Calibration.
  13. Potentiometer – Resistivity & Comparison of Resistances.
  14. Carey Foster's Bridge - Resistivity of the Material of the Wire.
  15. Carey Foster's Bridge - Temperature Coefficient of Resistance.
  16. Sonometer- Determination of A.C. Frequency.

**18UPH14**

**Reference Book:**

M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, “A Textbook of Practical Physics”, Sultan Chand & Sons educational Publishers, NewDelhi, First edition 1990, Reprint: 2011.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme**  
**Semester II**  
**(2018-2021)**

**Non – Major Elective Course - II : Physics in Everyday Life -II (18UPHN21)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                  |             |
|-------------------|-----------------|------------------|-------------|
| <b>Credit</b>     | <b>: 1</b>      | <b>Int.Mark</b>  | <b>: 25</b> |
| <b>Hours/Week</b> | <b>: 2</b>      | <b>Ext.Mark</b>  | <b>: 75</b> |
| <b>Duration</b>   | <b>: 30 hrs</b> | <b>Max. Mark</b> | <b>:100</b> |

**Course Objectives:**

- To impart knowledge of physics to students other than physics major.
- To get clear idea about memory storage devices.
- To understand the basic communication systems.
- To get an exposure on optical fibres and their uses.
- To enhance the knowledge on technical details of color TV.

**Course Outcomes:**

1. Acquire knowledge in the basic concepts of physics.
2. Decipher the concept of memory storage devices.
3. Understand the internet and intranets communication system.
4. Familiarize with the design and operation of fiber optical communication.

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|   |                |
|---|----------------|
| <b>UNIT I</b>   | <b>(6 hrs)</b> |
| LED – LCD – LDR – Photodiode – Transducers – Piezoelectric Transducers – Photoelectric Transducers.   |                |
| <b>UNIT II</b>  | <b>(6 hrs)</b> |
| Memory System in Computers – Magnetic Core as Memory Device – Magnetic Core Construction – Magnetic Disc Memories – Floppy Disk.  |                |
| <b>UNIT III</b>   | <b>(6 hrs)</b> |
| IT – Modem – Picture Phone – Internet – Intranets – Communication Channels – Wired Windows.   |                |
| <b>UNIT IV</b>  | <b>(6 hrs)</b> |
| Fiber Optics – Structure of Optical Fibers – Classification of Optical Fibers – Propagation of Light – Optical Fiber Cable – Fiber Optic Communications – Advantages of Optic Fibers – Disadvantages. |                |
| <b>UNIT V</b>   | <b>(6 hrs)</b> |
| TV – TV Broadcasting System – Color TV – Compatibility – Properties of Colors – Production of Color TV Signals – Color TV Camera.   |                |

**Text Book:**

Study materials prepared by Department of Physics, Sri Kaliswari College, Sivakasi.

| <b>Unit</b> | <b>Chapter</b> | <b>Section</b> | <b>Page No.</b> |
|-------------|----------------|----------------|-----------------|
| I           | 1              | 1.1.1. - 1.7.1 | 1 – 8           |
| II          | 2              | 2.1 - 2.5.2    | 10 – 15         |
| III         | 3              | 3.1 - 3.7      | 16 – 20         |
| IV          | 4              | 4.1 - 4.8      | 22 – 27         |
| V           | 5              | 5.1 - 5.6.1    | 29 – 33         |

**Reference Books:**

1. B. L. Theraja, “Basic Electronics solid state”, S. Chand and company Ltd., New Delhi, 2003.
2. Dr.M.Arumugam, “Semiconductor Physics and Optoelectronics”, Anuradha publications, 2005.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme – B.Sc**

**Semester II**

**(2018-2021)**

**Enrichment Course - II: Photography (18UPHE21)**

**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credit</b>     | <b>: 1</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 2</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 30 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To create interest among the students to know different photographic lenses.
- To enhance the knowledge on technical details of digital camera and video camera.
- To give on exposure on different types of zooming and storage methods.
- To enrich the knowledge of computer aided photography.
- To allow the learners to modify the images using software filters.

**Course Outcomes:**

7. Develop the creative ways to solve the variety of photography strategies.
8. Apply a high level of understanding to the issues surrounding the creation of digital artwork.
9. Know how to use various features of the camera to have creative control of photographs.
10. Understand the use of photo editing software to improve the overall appearance of images.

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**UNIT I** **(6 hrs)**

**Types of camera and lens :** Photographic Camera – Parts – Camera Types – TLR – SLR – Automatic Camera – Lens type – Close up – Wide Angle – Tele Photo and Zoom Lenses – Depth of Focus – ‘f’ Number – Shutter Speed - Flash Photography.

**UNIT II** **(6 hrs)**

**Digital Camera:** Digital Camera – Pixels – Sensors (CCD and CMOS) – Video Camera - Metering – Matrix, Center Weighted, Spot (Elementary Ideas).

**UNIT III** **(6 hrs)**

**Storage Card:** Types – Compact Flash, Smart Media Source, Secured Digital (SD) Card, Multimedia Card (Elementary Ideas) - Digital Zooming - Image Transformation from Storage Card to Personal Computer.

**UNIT IV** **(6 hrs)**

**Editing Image Using Photoshop:** Introduction to Photoshop CS4 Program Window – Exploring the New Interface (Application Bar, Menu Bar, Options Bar, Status Bar) – Toolbox - Working with Commonly Used Photoshop Tools – Palettes – Working with Palettes – Working with Selection Tools.

**UNIT V****(6 hrs)**

**Working with Photoshop:** Creating New Document – Saving Files – Reverting Files– Comparing Bitmap and Vector Image – Editing Images – Rotating – Cropping – Brightness and Color Adjustment - File Format (PSD, TIFF, JPEG, PDF) - Filter for Special Effects.

**Text Books:**

- 1.“Notes prepared by the Physics Department”, Sri Kaliswari College(Autonomous), Sivakas
- 2.Vikas Gupta, “Comdex 9-in-1 DTP Course Kit”, Dream tech Press, New Delhi, 2010.
- 3.Shruti Lal, “Photoshop CS”, Firewall media Laxmi publications Pvt, Ltd, New Delhi, First Edition, 2011.

| <b>Unit</b> | <b>Text Book No.</b> | <b>Chapter</b> | <b>Section</b> | <b>Page No.</b>      |
|-------------|----------------------|----------------|----------------|----------------------|
| I           | 1                    | 1              | 1.1 -1.10      | 1 - 8                |
| II          | 1                    | 2              | 2.1 - 2.8      | 9 - 13               |
| III         | 1                    | 3              | 3.1 - 3.7      | 14 - 21              |
| IV          | 2                    | -              | -              | 166- 179 , 205 - 218 |
| V           | 2                    | -              | -              | 180-183 , 190 - 205  |
|             | 3                    | -              | -              | 337-360              |

**Reference Books:**

- 1.S.Thiyagarajan,“Practical Photography”, Ennes Publications, Third Edition, 2006.
2. Robert shufflebotham,“PhotoshopCS (V8),” published by Dream Tech Press, 2008.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme – B.Sc**

**Semester III**

**(2018-2021)**

**Core Course – VI: Optics (18UPHC31)**

**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 3</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 45 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- This course helps to enhance the knowledge in optical lenses.
- To understand the dispersion in prisms and aberration in lens.
- To study the applications of interference effect.
- To be familiar with the phenomena of diffraction.
- To enable the students to understand the basic concepts of polarization.

**Course Outcomes:**

1. Apply the fundamental principles of optics to solve problem in future careers.
2. Enable to handle microscope and form thin film and measure the radius of curvature of Plano convex lens.
3. Understand the dispersion of light and determine the dispersive power of the prism.
4. Application of interference, diffraction and polarization experiment.

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**UNIT I**

**(9 hrs)**

**Lenses, Optical system and cardinal points:** Lens Equation (Thin Lenses) - Deviation by Thin Lens – Power of a Thin Lens - Equivalent Focal Length of Two Thin Lenses i) In Contact and ii) Out of Contact – Cardinal Point of an Optical System – Principal Points and Principal Planes – Focal Points and Focal Planes – Nodal Points and Nodal Plane – Newton’s Formula and Graphical Construction of Image Using Cardinal Points - Applications of Lens Combinations: Telephoto Lens – Telescope Lens.

**UNIT II**

**(9 hrs)**

**Dispersion and lens Aberrations :** Dispersion by a Prism – Refraction Through Prism- Dispersive Power – Angular and Chromatic Dispersion – Achromatic Combination of Prism – Deviation without Dispersion – Dispersion without Deviation – Direct Vision Spectroscopy – Aberration – Spherical Aberration in Lenses and its Removal - Chromatic Aberration in Lenses – Achromatic Lenses – Oil Immersion Objective of High Power Microscope.

**UNIT III**

**(9hrs)**

**Interference:** Introduction – Young’s double slit experiment – Fresnel biprism – Lloyd’s Single Mirror – Plane Parallel Film – Newton’s ring – Michelson’s Interferometer – Fabry Perot Interferometer – Antireflection Coatings - Interference

**18UPH20**



**UNIT IV****(9 hrs)**

**Diffraction:** Rectilinear Propagation of Light – Zone Plate – Action of Zone Plate for an Incident Spherical Wave Front – Difference Between a Zone Plate and Convex Lens – Difference between Diffraction and Interference - Fresnel and Fraunhofer Types of Diffraction – Diffraction Pattern due at a Circular Aperture – Diffraction at an Opaque Circular Disc – Plane Diffraction Grating.

**UNIT V****(9 hrs)**

**Polarization :** Types of Polarization – Polarization by Refraction – Pile of Plates – Polarizer and Analyser – Nicol Prism - Anisotropic Crystals - Huygen’s Construction of Wave Fronts – Quarter Wave Plate and Half Wave Plate - Production and Analysis of Linear, Elliptically and Circularly Polarized Light – Optical Activity – Optical Rotation – Specific Rotation - Fresnel’s Explanation of Optical Rotation.

**Text Book:**

Dr.N.Brijlal Subramanian, Dr.M.N.Avadhanulu, “A Text Book of Optics”, S. Chand and Company 25<sup>th</sup> Revised edition, Reprint 2013.

| Unit | Chapter | Section   | Page No.   |
|------|---------|---|--|
| I    | 4       | 4.8, 4.9, 4.15 - 4.17   | 76 - 78 , 84 - 87  |
|      | 5       | 5.2 - 5.4   | 92 - 97  |
|      | 6       | 6.8   | 132 - 134  |
| II   | 8       | 8.1 - 8.8   | 162 - 169  |
|      | 9       | 9.2, 9.5, 9.10, 9.11, 9.13, 9.14  | 172 - 179 , 187 - 196  |
| III  | 14      | 14.4 - 14.5, 14.9, 14.9.1 , 14.10,  | 315 - 317 , 320 - 323 , 326 - 327 , 329 - 320                        |
|      | 15      | 15.2, 15.2.1, 15.2.2, 15.6, 15.6.1, 15.6.2, 15.6.3, 15.7 , 15.7.1, 15.7.2, 15.7.3 , 15.12 , 15.15 , 15.17 | 340 - 343 , 337 - 380  |
| IV   | 17      | 17.4 - 17.9   | 397 - 405 , 407 - 408  |
|      | 18      | 18.7, 18.7.1.   | 440 - 444  |
| V    | 20      | 20.5, 20.6.2, 20.8, 20.10,20.12, 20.14, 20.19 - 20.21, 20.27 - 20.30 , 20.37                              | 484 - 488 , 490 - 491 , 493 - 498 ,502 – 507 , 515 - 519 , 529 - 533 |

**Reference Books:**

1. S.L. Kakani, and A.K Bhandari, “A Text Book of Optics”, S. Chand and Sons, 10<sup>th</sup> Edition, 2005.
2. Francis A.Jenkins, Harley E.White, “ Fundamentals of Optics”, McGraw Hill International, 4<sup>th</sup> Edition.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme – B.Sc**

**Semester III**

**(2018-2021)**

**Core Course - VII: Electricity and Electromagnetism (18UPHC32)**

**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 3</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 45 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To understand the basic concepts of Electric field and Electric potential.
- To enrich their knowledge in electric circuits and electrical measurements.
- To learn and understand the magnetic effect of electric current.
- To familiarize with the laws of electromagnetic induction.
- To understand the concept of growth and decay of steady current in electric Circuits.

**Course Outcomes:**

1. Gain knowledge to solve electric fields for various charge distributions.
2. Enable to understand the concepts of Current and Current density.
3. Enable to understand the concepts of Magnetic fields.
4. Thorough knowledge in the basic concepts of electromagnetic induction.
5. Able to derive expression for growth and decay of current in different AC circuits.

**UNIT I (9 hrs)**

**Charge and Fields:** Basic Concepts – Coulomb’s Law - Electric Field - Electric Field Due to a Point Charge - Flux of the Electric Field - Gauss Law – Applications of Gauss Law – Electric Field due to Uniformly Charged Sphere, Infinite Line of Charge and Infinite Plane Sheet of Charge - Coulomb’s Theorem - Mechanical Force Experienced by Unit Area of a Charged Conductor - Electric Potential – Electric Potential Due to a Uniformly Charged Conducting Sphere – Potential and Field due to an Electric Dipole.

**UNIT II (9 hrs)**

**Current and Electrical Conductivity:** Current and Current Density – Expression for Current Density - Ohm’s Law and Electrical Conductivity - Kirchhoff’s laws – Application of Kirchhoff’s Laws to Wheat stone’s Bridge – Sensitiveness of a Wheat stone’s Bridge – Carey Foster Bridge – Potentiometer – Calibration of Ammeter and Voltmeter (Low Range and High Range) – Measurement of Thermo EMF Using Potentiometer.

**UNIT III (9 hrs)**

**Magnetic Effect of Electric Current:** Biot Savart’s Law- Magnetic Induction at a Point Due to a Straight Conductor Carrying Current – Magnetic Induction at a Point on the Axis of a Circular Coil Carrying Current - Ampere’s Circuital Law - Force on a Current Carrying Conductor in a Magnetic Field - Torque on a Rectangular Coil Placed in a Magnetic Field – Moving Coil Ballistic Galvanometer (No Damping Correction) – Current and Voltage Sensitivity of a Moving Coil

Galvanometer – Measurement of Charge Sensitivity of a B.G – Determination of the Absolute Capacity of a Condenser.

**UNIT IV** (9 hrs)

**Electromagnetic Induction:** Faraday's Laws of Electromagnetic Induction – Self Inductance – Experiment to Determine L by Rayleigh's Method – Mutual Inductance – Determination of Mutual Inductance using B.G - Coefficient of Coupling - Growth & Decay of Current in LR circuit & CR Circuit – Measurement of High Resistance by Leakage - Growth & Decay of Charges in LCR Series.

**UNIT V** (9 hrs)

**Alternating Current:** Alternating Current – LCR Series Resonance Circuit – Parallel Resonance Circuit - Comparison between Series and Parallel Resonance Circuit – Power in an a.c. Circuit - Power Factor - Wattless Current - Choke Coil - A.C. bridges- Maxwell's Bridge – Owen's Bridge - De Sauty's Bridge and Anderson's Bridge.

**Text Book:**

R.Murugasen, "Electricity and Magnetism", S.Chand and Company Pvt. Ltd. Delhi,  
9<sup>th</sup> Revised Edition, 2014.

| Unit | Chapter | Section                            | Page No.                            |
|------|---------|------------------------------------|-------------------------------------|
| I    | 1       | 1.1-1.5                            | 1-4                                 |
|      | 2       | 2.1, 2.2, 2.5, 2.7,2.9, 2.11-2.12  | 12-19,21,22-26                      |
|      | 3       | 3.1, 3.5, 3.7                      | 34-35,39-40,43-44                   |
| II   | 6       | 6.1, 6.2, 6.4,6.6, 7.1,7.2,8.3     | 84-87                               |
|      | 7       | 7.1,7.2                            | 90-94,97-101                        |
|      | 8       | 8.3                                | 106-107                             |
| III  | 10      | 10.1-10.4,10.17, 10.7, 10.10-10.14 | 130-136,155-156,141-142,<br>144-152 |
| IV   | 11      | 11.1, 11.3-11.5, 11.7, 11.9, 11.10 | 163-170,172,174-176                 |
|      | 12      | 12.1- 12.6.                        | 190-204                             |
| V    | 13      | 13.1-13.6                          | 209-229                             |
|      | 19      | 19.1-19.4                          | 325-327                             |
|      | 11      | 11.6                               | 170-172                             |

**Reference Books:**

1. D.N. Vasudeva, "Electricity and Magnetism with Electronics", S.Chand and Co., 2002.
2. Dr. K.K. Tewari, "Electricity and Electromagnetism", S.Chand and Co., 2002.
3. Seghal, Chopra and Seghal, "Electricity and Electromagnetism", S.Chand and Co., 2009.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme - B.Sc**

**Semester III**

**(2018-2021)**

**Skill Based Course - I: Thermal Physics (18UPHS31)**

**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 2</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 2</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 30 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To be familiar with the laws of thermodynamics.
- To gain information about different types of engines.
- To acquire knowledge of methods of liquefaction of gases.
- To be familiar with the laws of black body radiation.
- To acquire basic knowledge in Statistical Mechanics.

**Course Outcomes:**

1. Thorough knowledge in fundamental principles of thermodynamics.
2. Ability to understand the difference between different types of engines.
3. Acquire knowledge in liquefaction of different gases.
4. Understand the basic concepts of cryogenics.
5. Able to understand the basic concepts of Statistical Mechanics.

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**UNIT I** **(6 hrs)**

**Thermodynamics:** First law of Thermodynamics – Isothermal Process – Adiabatic Process- Second law of Thermodynamics – Entropy – Change in Entropy in a Reversible Process - Change in Entropy in a Irreversible process – Process of Increase in Entropy.

**UNIT II** **(6 hrs)**

**Heat Engines :** Carnot's Cycle – Efficiency of Carnot's Cycle – Carnot Engine and Refrigerator – Coefficient of Performance - Carnot's Theorem - Internal Combustion Engine (Petrol engine) – Diesel Engine – Multiples Engines.

**UNIT III** **(6 hrs)**

**Liquefaction of Gases:** Introduction – Different Methods of Liquefaction of Gases - Cooling by Adiabatic Expansion – Joule-Thomson Expansion (Principle and Results Only) - Liquefaction of Oxygen by Cascade Process – Liquefaction of Hydrogen – Liquefaction of Helium – Adiabatic Demagnetization.

**UNIT IV** **(6 hrs)**

**Radiation:** Thermal radiation - Prevost's Theory of Heat Exchange – Black Body radiation – Kirchhoff's Law and its Applications – Stefan-Boltzmann Law – Distribution of Energy in a Black Body Spectrum – Wien's Displacement Law – Rayleigh Jeans Law – Planck's Radiation Law (No Derivation) - Experimental Verification of Stefan' Law.

**UNIT V****(6 hrs)**

**Statistical Mechanics:** Definition of Phase Space – Macroscopic Description – Ensembles – Probability – Thermodynamic Probability – Boltzmann’s Theorem of Entropy and Probability - Fundamental Postulates of Statistical Mechanics – Statistical Equilibrium – Quantum Statistics – Electron Gas.

**Text Books:**

1. Brijlal N.Subramanyam, P.S. Hemne “Heat and thermodynamics”, S. Chand and Company LTD, New Delhi Revised edition (2010) Reprint 2012.
2. R.Murugesan, Er. Kiruthiga Sivaprasath, “Modern Physics”, S. Chand and company LTD, New Delhi 7<sup>th</sup> Revised Edition, 2014.

| Unit | Text Book No. | Chapter | Section   | Page No.                           |
|------|---------------|---------|---|------------------------------------|
| I    | 1             | 4       | 4.7, 4.10.4, 4.10.7, 4.28                               | 112-113, 118, 120 – 121, 139 – 140 |
|      |               | 5       | 5.2, 5.4-5.6  | 173 – 179                          |
| II   | 1             | 4       | 4.24-4.27,4.29, 4.32 - 4.34                             | 134 – 139, 140 – 141, 144 – 149    |
| III  | 1             | 7       | 7.1, 7.4, 7.5, 7.9 – 7.11, 7.16.                        | 268 – 273, 278 – 284               |
| IV   | 1             | 8       | 8.1, 8.3, 8.6, 8.7, 8.10, 8.12 - 8.15, 8.17, 8.21, 8.22 | 298 - 302 , 306 – 310, 315 - 316   |
| V    | 2             | 75      | 75.2, 76.1 – 76.9                                       | 928. 938 - 943                     |

**Reference Books:**

1. Satya prakash and Dr. J.P Agarwal “Thermodynamics Statistical Physics and Kinetics”, Kedarnath, Ramnath and Co, 7<sup>th</sup> Edition.
2. D.S.Matthur “Heat and Thermodynamics”, Sultan Chand and Sons, Fifth Edition, 2004.

**Sri Kaliswari College (Autonomous) , Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester III**  
**(2018-2021)**

**Value Based Course-I: Physics of House Hold Appliances-I (18UPHV31)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credit</b>     | <b>: 1</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 2</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 30 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To understand electrical connections of House wiring. and the related safety precautions.
- To have practical knowledge on various home lighting systems.
- To get an exposure on various electrical heating systems.
- To have an idea of working of motors and their applications.
- To know the working of refrigerator and air conditioner.

**Course Outcomes:**

1. Ability to understand the wire connection like single phase, three phase and fuse circuit.
2. Develop the practical knowledge on various home lighting system.
3. Gained knowledge in the electrical heating systems like water heater, electric stove, and Induction cooker.
4. Decipher the different types of motor and practical applications.
5. Familiarize with principle and working of water cooler and air conditioner.

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**UNIT I** **(6hrs)**

**Electric Power Distribution and its Safety in Home:** House Wiring – Single Phase Circuit Connection – Switch Connection – Power Rating – Wattmeter – Line Tester – Fuses – Types of Fuse – Circuit Breaker – Causes of Electric Shock – Types of Earthing – Safety Precaution.

**UNIT II** **(6hrs)**

**Electrical Lamps:** Filament Lamp: Power Rating, Disadvantages – Fluorescent Lamp: Working Principle, Advantages – CFL: Working Principle, Advantages– LED: Working Principle, Different Materials used Advantages.

**UNIT III** **(6hrs)**

**Electrical Heating Devices:** Water Heater: Various Types, Power Rating, Basic Circuits, Precaution - Electric Stove: Various Types – Toaster – Timer - Temperature Controller - Induction Cooker - Electric Iron.

**UNIT IV** **(6hrs)**

**Types of Motor and Uses:** Single Phase – Three Phase - Delta and Star Winding- Basic Principle of Electric Motor – DC Motor - Induction Motor –Universal Motor – Table Fan –

Ceiling Fan – Mixie - Sewing Machine – Hair Drier.

**UNIT V**

**(6hrs)**

**Refrigeration and Air Conditioning:** Refrigeration: Laws, Unit of Refrigeration - Vapor Compression Refrigeration Cycle - Precaution in Refrigeration System - Refrigerator- Water Cooler- Principle of Air Conditioner – Room Air Conditioner.

**Text Book:**

Study Materials prepared by Department of Physics, Sri Kaliswari College, Sivakasi.

| <b>Unit</b> | <b>Chapter</b> | <b>Section</b> | <b>Page No.</b> |
|-------------|----------------|----------------|-----------------|
| I           | 1              | 1.1 - 1.9.5    | 5 - 14          |
| II          | 2              | 2.1 - 2.5.3    | 15 - 24         |
| III         | 3              | 3.1 - 3.8      | 25 - 32         |
| IV          | 4              | 4.1 - 4.10     | 33 - 40         |
| V           | 5              | 5.1 - 5.5      | 41 - 46         |

**Reference Books:**

1. Dr.N.C. Goyal, Dr.K.C. Arora,“A Text book of Hotel Maintenance”, Standard Publisher Distributors, First Edition.
2. K.Jeyachandran, S.Natarajan, R.Balasubramanian,“A Primer on Engineering Practices Laboratory”, Anuradha Agencies, Kumbakonam, Second Edition

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester IV**  
**(2018-2021)**

**Core Course - VIII : Mathematical Physics (18UPHC41)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 3</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 45 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To enable the students to familiarize with vector concepts.
- To encourage the students to understand matrices and make use of them.
- To be aware of Fourier and Laplace transforms to solve Physics problems.
- To enable students to get an exposure on basic of Group theory.
- To give enough knowledge in numerical methods to solve problems.

**Course Outcomes:**

1. Familiarize with vector concepts.
2. Ability to understand matrices and make use of them.
3. Ability to understand homogeneous and non- homogeneous linear equations.
4. Apply Fourier and Laplace transforms to solve Physics problems.
5. Familiarize with group theory concepts.

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**UNIT I** **(9hrs)**

**Vector Analysis:** Introduction - Gradient of a Scalar Field - Line, Surface and Volume Integrals - Divergence of a Vector function – Expression for Divergence in Cartesian Coordinates - Curl of a Vector Function - Expression for Curl in Cartesian Coordinates - Physical Significance of Curl - Important Vector Identities - Gauss’ Divergence Theorem - Stoke’s Theorem - Green’s Theorem.

**UNIT II** **(9 hrs)**

**Matrices-I:** Special Types of Matrices -Transpose of a Matrix - Complex Conjugate and Hermitian Conjugate Matrix- Adjoint of a Matrix - Inverse of a Matrix - Eigen Values, Eigen Vectors - Characteristic Equation of a Matrix – Cayley - Hamilton Theorem - Theorems on Eigen Values and Eigen Vectors- Diagonalization of Matrices.

**UNIT III** **(9 hrs)**

**Matrices-II:** Non-Homogeneous Linear Equations - Cramer’s Rule for Solving Non-Homogeneous Linear Equations - Homogeneous Linear Equations - Sub-Spaces and Null Spaces –Sylvester’s Theorem ( Sylvester’s Laws of Nullity) - Linear Transformation - Resultant of two Linear Transformations - Similarity Transformations – Unitary Transformation.

**UNIT IV** **(9 hrs)**

**Laplace Transforms:** Definition - Properties of Laplace Transforms – Derivative of Laplace Transforms – Laplace Transforms of Periodic Functions - Laplace Transform of



Derivatives - Laplace Transform of Integrals - Methods of Finding Laplace Transforms: Direct Method - Series – Expansion Method - Inverse Laplace Transforms - Applications of Laplace Transforms to Boundary Problems.

**UNIT V**

**(9 hrs)**

**Group Theory:** Concept of Group – Abelian Group – The Generator of a Finite Group – The Cyclic Group – The Group Multiplication Table – Subgroup – Cosets – Conjugate Element and Classes – The Product of Classes – Permutation Groups – Cayley’s Theorem – The Group of Symmetry of Equilateral Triangle – The Group of Symmetry of Square.

**Text Books:**

1. R.Murugesan, “Mechanics and Mathematical Physics”, Sultan Chand and Sons. Reprint2015.
2. Satya Prakash, “Mathematical Physics”, Sultan Chand and sons, Sixth Edition, 2011.

| Unit | Text Book No. | Chapter | Section                               | Page No.                    |
|------|---------------|---------|---------------------------------------|-----------------------------|
| I    | 1             | 7       | 7.1-7.12                              | 99-119                      |
| II   | 1             | 12      | 12.1-12.2                             | 183-189                     |
|      |               | 8       | 8.1-8.4                               | 131-145                     |
| III  | 1             | 12      | 12.3-12.13                            | 190-209                     |
| IV   | 1             | 15      | 15.1-15.11,15.16,15.27                | 239-251,253,269-270         |
| V    | 2             | 13      | 13.1-13.5, 13.7-13.10,<br>13.14-13.17 | 957-962,965-968,<br>974-979 |

**Reference Books:**

1. A.K Ghatak, L.C.Goyal, S.L Chua, “Mathematical Physics”, Macmillan India LTD, First Edition, 2002.
2. Arfken and Weber, “Mathematical Methods for Physicists”, Fifth Edition.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme –B.Sc**

**Semester IV**

**(2018-2021)**

**Core Course - IX: Spectroscopy and Laser Physics (18UPHC42)**

**(For those who join from June 2018 and afterwards)**

**Credits : 3**

**Hours/Week : 3**

**Duration : 45 hrs**

**Int.Marks : 25**

**Ext. Marks : 75**

**Max. Marks : 100**

**Course Objectives:**

- To impart the basic knowledge on Spectroscopy.
- To understand basic theory of IR and Microwave spectroscopy.
- To give an exposure on Raman spectroscopy.
- To be familiar with fundamentals of laser sources.
- To explain the importance of different types of laser and its applications.

**Course Outcomes:**

1. Understand the electromagnetic waves and their interaction with matter.
2. Knowledge about molecular structure using molecular methods (IR,Raman).
3. Acquire knowledge to determine the important functions of laser system.
4. Develop the practical applications of laser spectroscopic methods in science and technology.

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**UNIT I**

**(9 hrs)**

**Interaction of Radiation with Matter:** Characterization of Electromagnetic Radiation - Quantization of Energy - Regions of the Spectrum - Representation of the Spectra –Basic Elements of Practical Spectroscopy - Signal to Noise: Resolving Power - Width of Spectral Lines and Intensity of Spectral Transitions.

**UNIT II**

**(9 hrs)**

**Microwave and Infra-Red Spectroscopy :** The Rotation of Molecules – Rotational Spectra - Diatomic Molecule as Rigid Rotator – Techniques and Instrumentation – The Microwave Oven - Vibration Spectra – Vibrating Diatomic Molecule - The Simple Harmonic Oscillator – Anharmonic Oscillator.

**UNIT III**

**(9 hrs)**

**Raman Effect:** Introduction - Quantum Theory of Raman Effect - Classical Theory of Raman Effect: Molecular Polarizability - Polarization of Light and the Raman Effect – Vibration of Spherical Top Molecules - Structured Determination from Raman and Infrared Spectroscopy.

**UNIT IV**

**(9 hrs)**

**Lasers:** Introduction – Thermal Equilibrium – Absorption of Light – Spontaneous Emission of Light - Stimulated Emission – Einstein’s Coefficient and their Relation – Light

Amplification- Population Inversion - Meta Stable State – Components of Laser – Lasing Action – Three and Four Level Pumping Scheme.

**UNIT V**

**(9 hrs)**

**Types of Laser and applications:** Ruby laser- ND-YAG laser - Helium–Neon Laser - Carbon dioxide laser – Argon Ion Laser – Laser Beam Characteristics – Industrial Applications of laser – Laser Free Space Communication – Laser Metrology and LIDAR.

**Text Books:**

1. Colin N.Banwell and Elaine M McCash, “Fundamentals of Molecular Spectroscopy”, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 4<sup>th</sup> Edition, 2003.
2. Dr. N. Subrahmanyam Brijlal, Dr.M.N. Avadhanulu, “A Text of Optics”, S.Chand Company Ltd., 25<sup>th</sup> Revised Edition Reprint, 2013.
3. Richa Sharma and Vibhu Sharma, “Laser Systems and applications”, - ALTBS Publishers, India, 2010.

| Unit | Text Book No. | Chapter | Section                        | Page No.                     |
|------|---------------|---------|--------------------------------|------------------------------|
| I    | 1             | 1       | 1.1 - 1.7                      | 1 - 20                       |
| II   | 1             | 2       | 2.1 - 2.3.1, 2.3.3, 2.5, 2.7   | 31 - 37 , 40 - 42, 51 - 52 , |
|      |               | 3       | 3.1 -3.1.3.                    | 55- 63                       |
| III  | 1             | 4       | 4.1 - 4.1.2 , 4.4 - 4.4.2, 4.5 | 100 -104 , 116 – 121         |
| IV   | 2             | 22      | 22.1 , 22.3 - 22.10            | 597 - 617                    |
| V    | 2             | 22      | 22.14 - 22.19                  | 621 – 628, 631 - 633         |
|      | 3             | 4       | 4.5.3.2.1                      | 136 - 139                    |
|      |               | 6       | 6.3.1                          | 197 – 199                    |

**Reference Books:**

1. K.V. Raman, R.Gopalan, P.S.Raghavan , “Molecular Spectroscopy”, Vijay Nicole Imprint, Chennai, 2004.
2. S.L. Kakani, and A.K Bhandari, “A Text Book of Optics”, S. Chand and Sons, 10<sup>th</sup> Edition, 2005.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester III and IV**  
**(2018-2021)**

**Core Course –X: Major Physics Practical- II (18UPHC4P)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 4</b>      | <b>Int.Marks</b>  | <b>: 40</b>  |
| <b>Hours/Week</b> | <b>: 2 + 2</b>  | <b>Ext. Marks</b> | <b>: 60</b>  |
| <b>Duration</b>   | <b>: 60 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To enrich their knowledge in electric circuits and electrical measurements.
- To familiarize with the measurement of unknown Capacitances.
- To understand the basic concepts of interference and diffraction patterns.
- To provide basic knowledge in C programming.
- To familiarize with the measurement of refractive index of different glass prisms.

**Course Outcomes:**

6. Able to understand the dispersion of light and determine the dispersive power of the prism.
7. Ability to measure the wavelength of given monochromatic source and to determine the thickness of given thin wire by forming interference patterns.
8. Able to compare the emf of different cells and to determine the emf of unknown cell using Potentiometer.
9. Able to handle the Spectrometer and to determine the number of lines of the grating and wavelength of the different colours.
10. Able to solve simple Physics problems using C Language.

- 
1. Potentiometer - Temperature coefficient.
  2. Potentiometer – Comparison of EMF.
  3. Table galvanometer – figure of merit.
  4. De Sauty's bridge-  $C_1/C_2$
  5. Spot galvanometer – comparison of emf.
  6. Air wedge- Thickness of the wire.
  7. Newton's Ring – radius of curvature
  8. Determination of  $B_H$  - axial coil
  9. Determination of M- axial coil
  10. Determination of M and  $B_H$ - Tan C method
  11. Spectrometer - Dispersive power of the material of the prism.
  12. Spectrometer- Normal Incidence –Grating- To find N and  $\lambda$
  13. Spectrometer - i-d curve to find  $\mu$
  14. Spectrometer - Small Angled prism – Refractive index

15. To write Program in C to find the resonance frequency of LCR circuit for different values of C.

16. To write Program in C to find the most probable velocity of system of particles.

**Reference Book:**

M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, “A Textbook of Practical Physics”, Sultan Chand & Sons educational Publishers, New Delhi, First edition 1990, Reprint: 2011.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme –B.Sc**

**Semester IV**

**(2018-2021)**

**Major Elective Course - I: Programming in C (18UPHO41)**

**(For those who join from June 2018 and afterwards)**

**Credits : 3**

**Hours/Week : 4**

**Duration : 60 hrs**

**Int.Marks : 25**

**Ext.Marks : 75**

**Max. Marks : 100**

**Course Objectives:**

- To provide basic knowledge in C programming.
- To give an exposure on use of array variables in C.
- To understand and make use of functions in C.
- To know structure in C and its use in programming.
- To understand and use FILE handling facilities.

**Course Outcomes:**

1. Acquired knowledge in C programming.
2. Enable to write simple C- programs.
3. Able to solve simple Physics problems using C – Language.
4. Develop an interest to study various computer languages.

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**UNIT I**

**(12 hrs)**

**Data Types, Decision Making and Looping:** Introduction to C – Character Set- Identifiers and Keywords – Data Types – Variables and Constants – Operators – Expressions – Mathematical Functions - If and If – Else statement – Switch Statements – Goto Statement – While Statement – For Loop – Jumping in Loops – Exit Functions - Program Exercise: a) Find the Distance Travelled by a Particle at the Given Time and b) Find the Resonance Frequency of LCR Circuit for Different Values of C.

**UNIT II**

**(12 hrs)**

**Arrays:** One Dimensional Array – Processing One Dimensional Array – Two Dimensional Arrays – Initialization of Two Dimensional Array - Multidimensional Array – Strings and Character Arrays - String Handling Functions - Program Exercise: a) To Find Standard Deviation b) To Find the Most Probable Velocity of System of Particles.

**UNIT III**

**(12 hrs)**

**Function:** Definition of Function – Return Statement and their Types – Category of Functions – Recursion - Program Exercise: a) Find the Frequency of a RC Circuit for Different Values of Capacitance using Functions b) Find the Factorial of a Given Number.

**UNIT IV**

**(12 hrs)**

**Structure and Pointer:** Defining a Structure – Processing a Structure - Arrays of Structure – Structure within Structures – Pointer Declaration – Pointers and Simple Variables -

Program Exercise: a) Comparison of Structure Variables (Comparison of Physical Properties of Material) b) Using Pointer to Compute the Sum of all Elements (Life Time of Atoms) Stored in an Array.

**UNIT V**

**(12 hrs)**

**File Management in C :** Defining and Opening a File - Closing a File - Input/ Output Operations on Files – Error Handling During I/O Operations - Random Access to Files – Program Exercise a) Copy the Contents of One File to Another File b) To Get Data with fseek ().

**Text Book:**

E.Balagurusamy, “Programming in ANSI C”, Tata McGraw Hill Publishing Company, 6<sup>th</sup> Edition, 2012.

| Unit | Chapter | Section                  | Page No.  |
|------|---------|--------------------------|---|
| I    | 2       | 2.1 – 2.8                | 22 -35  |
|      | 3       | 3.1 – 3.12 , 3.16        | 52 – 66 , 73 – 74                               |
|      | 5       | 5.1 – 5.4 5.7 – 5.9      | 112 – 118, 127 – 131 , 135 – 136                |
|      | 6       | 6.2- 6.5                 | 153 -159, 168 – 169, 173                        |
| II   | 7       | 7.1 – 7. 7               | 192 - 199, 203 – 208, 215 – 216                 |
|      | 8       | 8.1 - 8.4, 8.8           | 237 – 243, 245 – 246, 249, 253 – 255, 257 - 259 |
| III  | 9       | 9.5 – 9.13, 9.16         | 274 - 293, 295 – 296                            |
| IV   | 10      | 10.2 – 10.5, 10.8– 10.10 | 324 – 331, 334 – 340                            |
|      | 11      | 11.1 – 11.6              | 355 – 365                                       |
| V    | 12      | 12.1 – 12.7              | 395 – 408, 414                                  |

**Reference Books:**

1. Herbert Schidt, “The Complete Reference-C”, Tata McGraw Hill, NewDelhi, Fourth Edition.
2. Dr.S.Ramaswamy and P.Radhaganesan, “Programming in C”, Scitech Publications (INDIA) Pvt.Ltd. Chennai, 2008.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester IV**  
**(2018 – 2021)**

**Major Elective Course-I: Consumer Affairs (18UPHO42)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                  |              |
|-------------------|-----------------|------------------|--------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int.Marks</b> | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 4</b>      | <b>Ext.Marks</b> | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 60 hrs</b> | <b>Max.Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To familiarize the learners with their rights and responsibilities as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights.
- To provide an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards.
- To enable the learners to comprehend the business firms' interface with consumers and the consumer related regulatory and business environment.

**Course Outcomes:**

1. The learners know about the need for consumer protection and the areas covered by consumer protection law.
2. Learners will have a clear idea on legislative controls on unconscionable conduct, misleading or deceptive conduct, false or misleading representations and other unfair practices.
3. The learners know the legal obligations of a supplier of goods or services.
4. The learners know the obligations of manufacturers and the rights of consumers to compensation.
5. The learners know the bodies available to protect the rights of the consumer and discuss their operations.

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**UNIT I** **(12 hrs)**

Consumer – meaning, Consumer and markets – Whole sale, Retail and Online markets concept of price – Retail price including Maximum Retail Price (MRP) with Goods and Service Tax (GST) - Consumer problems – Consumer Complaints – defect in goods, spurious goods, deficiency service – unfair trade practices – Restrictive trade practices.

**UNIT II** **(12 hrs)**

Consumer Rights and UN Guidelines on Consumer Protection – Consumer Protection Act, 1996, Consumer Protection Bill 2018. Consumer Protection Council – Objectives – Dispute Redressal forums – Central, State and District lands – Composition, Powers and Jurisdiction.

**UNIT III** **(12 hrs)**

Grievance Redressal Mechanism under the Indian Consumer Protection Law : Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and



hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties. Recent Cases decided under Consumer Protection law by Supreme Court/National Commission.

**UNIT IV (12 hrs)**

Role of Industry Regulators in Consumer Protection: Banking: RBI and Banking Ombudsman - Insurance: IRDA and Insurance Ombudsman - Telecommunication: TRAI - Food Products: FSSAI - Electricity Supply: Electricity Regulatory Commission - Real Estate Regulatory Authority

**UNIT V (12 hrs)**

Contemporary Issues in Consumer Affairs: Consumer Movement in India: Evolution of Consumer Movement in India. Interest of consumer and Misleading Advertisements, National Consumer Helpline and Product testing - Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance.

**Text Books:**

1. "The Consumer Protection Act, 1986", Universal Law Publishing, New Delhi, 2017.
2. Dr. Francis Cherunilam, "Business Environment: Text and Cases", Himalaya Publishing House, Mumbai, 26<sup>th</sup> Revised Edition, 2017.
3. Swarup C. Sahoo and Suresh C. Das, "Insurance Management: Text and Cases", Himalaya Publishing House, Mumbai, 2<sup>nd</sup> Revised Edition, 2017.

| Unit | Text Book No. | Chapter | Section | Page No.                |
|------|---------------|---------|---------|-------------------------|
| I    | 1             | 1 & 2   | -       | 3 - 14                  |
| II   | 2             | 10      | -       | 188 - 206               |
| III  | 1             | 3       | -       | 14 – 36                 |
| IV   | 3             | 25 & 27 | -       | 220 – 229,<br>244 - 249 |
| V    | 1             | 4       | -       | 40 – 54                 |

**Reference Books:**

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi, "Consumer Affairs" - Universities Press, 2007
2. Choudhary, Ram Naresh Prasad, "Consumer Protection Law Provisions and Procedure" - Deep Publications Pvt Ltd, 2005.
3. G. Ganesan and M. Sumat, "Globalisation and Consumerism", - Regal Publications, 2012.
4. Rajyalaxmi Rao, "Consumer is King", - Universal Law Publishing Company, 2012.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester IV**  
**2018-2021**

**Major Elective Course – I : Statistical Mechanics (18UPHO43)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 4</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 60 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To enable the learners to understand the basic concepts in statistical mechanics.
- To impart knowledge on Maxwell-Boltzmann statistics.
- To enable the learners to apply the statistical mechanics in thermodynamics.

**Course Outcomes:**

1. Understand the basic rules of probability theory.
2. Ability to understand the different types of ensembles.
3. Understand the basic difference between the distribution laws like Maxwell-Boltzmann, Fermi-Dirac, Bose-Einstein Statistics.
4. Basic knowledge acquired in quantum Statistics.
5. Be able to solve simple problem in Statistical Mechanics.

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**UNIT I** **(12 hrs)**

Statistical basis – Probability – Probability and Frequency – Some Basic Rules of Probability Theory – Permutations and Combinations – Macrostate and Microstate – Thermodynamic Probability – Fluctuations and their Dependence on ‘n’ – Constraints on a System – Static and Dynamic Systems – Most Probable State – Life time of a Microstate and Macrostate – Concept of a Cell in a Compartment – Ensemble and Average Properties.

**UNIT II** **(12 hrs)**

Degrees of Freedom – Position Space – Momentum Space – Phase Space –  $\mu$  Space and  $\gamma$  Space – Division of Phase Space into Cells – Applications - one Dimensional Harmonic Oscillator – Free Particle – Fundamental Postulates of Statistical Mechanics – Density of Quantum States of Energy of a Particle – Statistical Ensembles – Kinds of Ensembles – Comparison of Ensembles – Equilibrium between Two Systems in Thermal Contact – Bridge with Macroscopic Physics.

**UNIT III** **(12 hrs)**

Theories Based on Statistical Mechanics – Entropy and Probability – Boltzmann Entropy Relation – Boltzmann Canonical Distribution Law – Application of Boltzmann Canonical Distribution Law – Equipartition of Energy – Statistical Interpretation of Second Law of

Thermodynamics – Partition Function and its Relation with Thermodynamic Quantities – Entropy of an Ideal gas - Gibbs Paradox.

**UNIT IV (12 hrs)**

Three Kinds of Particles – Maxwell Boltzmann Statistics Applicable to Ideal Gas - Maxwell Boltzmann Energy Distribution Law – M.B Energy Distribution Function for an Ideal Gas – Condition for Application of M.B Statistics – Applications of M.B Distribution law – Mean, RMS and Most Probable Speeds of Gas Molecules – Maxwell’s Distribution Law of Velocities – Doppler Broadening of Spectral Lines – Limitations of M.B Method.

**UNIT V (12 hrs)**

Need for Quantum Statistics – Development of Quantum Statistics – ‘h’ as a Natural Constant – Indistinguishability of Particle and its Consequences – Bose Einstein Distribution Law – Photon Gas – Planck’s Radiation Law – Fermi-Dirac Distribution Law – Free Electrons in Metal: Electron Gas – Fermi Level and Fermi Energy – Fermi Energy at 0 K for Electron in a Metal – Comparison of the Three Statistics.

**Text Book:**

Brij Lal, N. Subrahmanyam, P.S. Hemne “Heat, Thermodynamics and Statistical Mechanics”, S. Chand and Company Ltd, New Delhi, 2007.

| Unit | Chapter | Section           | Page No.     |
|------|---------|-------------------|--------------|
| I    | 9       | 9.1 - 9.15        | 349-371      |
| II   | 10      | 10.1 - 10.3       | 379-392      |
| III  | 10      | 10.14-10.21       | 392-406      |
| IV   | 11      | 11.1-11.8         | 414-439      |
| V    | 12      | 12.1-12.10, 12.15 | 451-472, 476 |

**Reference Books:**

1. B. K. Agarwal, Melvin Eisner “Statistical Mechanics”, New Age International Publishers, New Delhi, II Edition, 1998.
2. B.B.Laud “Fundamentals of Statistical Mechanics”, New Age International Publishers, New Delhi, 2000.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme - B.Sc**  
**Semester V**  
**(2018-2021)**

**Core Course - XI: Atomic Physics and Quantum Mechanics (18UPHC51)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 5</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 5</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 75 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To understand the structure of atoms by various models.
- To give an exposure on X - ray spectra.
- To make students to understand the dual nature of radiation and matter.
- To give some basic idea about Quantum mechanics.
- To impart the basic skills to solve some problems in Quantum mechanics.

**Course Outcomes:**

1. Ability to understand the depth concepts in atomic physics.
2. The student can solve the numerical problems in atomic physics.
3. Familiarity in working method of X-ray spectrometer.
4. Capable of understanding the medical applications of laser.
5. Ability to solve problem in Quantum Mechanics.

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**UNIT I** **(15 hrs)**

Bohr's Atom Model – Hydrogen Spectrum – Spectral Lines - Bohr's Correspondence Principle – Sommerfeld Atom Model – Relativistic Theory – Vector Atom Model – Spatial Quantization – Spinning of Electron Hypothesis – Quantum Numbers – Coupling Schemes – Pauli's Exclusion Principle – Electronic Structure of Atoms.

**UNIT II** **(15 hrs)**

Classical and Quantum Theory of Zeeman Effect – Anomalous Zeeman Effect – Stark Effect - Production of X-rays – Diffraction of X- rays – X-ray Spectra Continuous and Characteristic X-rays Spectra – Mosley's Law & its Importance – Theory and Experimental Verification Compton Effect.

**UNIT III** **(15 hrs)**

Introduction – de-Broglie Wavelength – Davission & Germer Experiment – G.P Thomson Experiment with Relativistic Correction – Group and Phase Velocity and their Relation – Heisenberg's Uncertainty Principle – Diffraction of Electron Through a Single Slit – Wave Mechanical Atom Model – Mathematical Proof of Uncertainty Principle for one Dimensional Wave Packet.

**UNIT IV** **(15 hrs)**

Basic Postulates of Wave Mechanics – Properties of Wave Function: Physical Significance of  $\psi$  - Time Dependent and Time Independent form of 1-D Schrodinger Equation - Orthogonal and Normalization of Wave Function – Probability Current Density - Eigen Value and Eigen Function – Postulates of Quantum Mechanics – Ehrenfest's Theorem.

**UNIT V****(15 hrs)**

The Free Particle Problem – Potential Step – The Barrier Penetration Problem – Particle in a Box - Infinite Square Well Potential – Rectangular Potential Well – Square Well in Three Dimensions – Linear Harmonic Oscillator – The Hydrogen Atom – The Rigid Rotator.

**Text Book:**

R.Murgeshan and Kiruthiga sivaprasath, “Modern Physics”, S.Chand and co pvt Ltd, Seventeenth revised edition, 2014.

| <b>Unit</b> | <b>Chapter</b> | <b>Section</b>   | <b>Page No.</b>                                      |
|-------------|----------------|--|--|
| I           | 6              | 6.4,6.7, 6.11 - 6.16                                   | 71 - 75, 82 - 83, 88 -100                            |
| II          | 6, 7           | 6.23, 6.25 - 6.26, 6.28                                | 109 - 111, 112 - 116, 117 - 118,                     |
|             |                | 7.2, 7.6 - 7.7, 7.11 - 7.14                            | 122 - 123, 127 - 129, 133 - 140                      |
| III         | 11             | 11.1, 11.3, 11.2, 11.4 - 11.6                          | 169 - 170, 175 - 177, 172 - 175, 178 - 184           |
| IV          | 11,12          | 11.7, 11.9, 11.8, 11.9, 12.2, 11.9                     | 184 - 185, 187, 185 - 187, 187 - 188, 220 - 221, 188 |
|             |                | 12.1,12.6  | 215 - 216, 227 - 229                                 |
| V           | 11,12          | 12.3, 11.11 - 11.12, 11.10, 12.4 - 12.5, 11.13 - 11.15 | 221 - 222, 191 - 196, 188 - 190, 222 - 227, 197 -204 |

**Reference Books :**

1. G. Aruldas, “Quantum Mechanics”, Prentice Hall of India Private Limited, New Delhi, 2005.
2. Arthur Beiser, “Concepts of Modern Physics”, Tata McGraw Hill, Sixth Edition, 2004.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester V**  
**(2018-2021)**

**Core Course - XII: Analog Electronics (18UPHC52)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 5</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 5</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 75 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To impart the knowledge on basic circuits using diodes.
- To impart basic skills on different biasing of transistor.
- To make them aware of constructing analog circuits.
- To get an exposure on different types of oscillators.
- To explain the importance of electronics in the field of communication.

**Course Outcomes:**

5. Acquire knowledge in the basic concepts of Analog Electronics.
6. Developed to design circuits in Analog Electronics.
7. Capable of solving problems in Analog Electronics.
8. Familiarize with applications of junction diode and IC voltage regulators.
9. Gained knowledge in CE mode single Stage transistor amplifier and related topics.
10. Understand the construction and working of different types of oscillators.
11. Understand the fundamental concepts of communication system.

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**UNIT I** **(15 hrs)**

**Diode and its Applications:** PN Junction Diode Rectifier – Ripple Factor - Capacitor filter, Choke Input Filter and  $\pi$  Section Filter – Half Wave Voltage Doublers – Fixed Positive and Negative Voltage Regulators – Regulator Dual Power Supply - Adjustable Voltage Regulators – Diode Clipping and Clamping Circuits – Diode as a Switch.

**UNIT II** **(15 hrs)**

**Transistor and JFET:** Common Emitter Mode Transistor Configuration - Load line and Operating Point – Transistor Biasing – Stabilization – Base Bias – Collector Feedback Bias – Voltage Divider Bias – Emitter Bias – Single Stage Amplifier – A.C and D.C Equivalent Circuits - Frequency Response - Voltage Gain of Loaded Amplifier – JFET - Characteristics and Important Terms – JFET Parameters and Relation Between them.

**UNIT III** **(15 hrs)**

**Power amplifier and OPAMP:** Classification of Power amplifiers - Transformer Coupled Class A Power Amplifier and its Efficiency - Push-Pull Class-B Power Amplifier and its Maximum Efficiency – Differential Amplifier – Operation of Differential Amplifier – Common Mode and Differential Mode Signals - Operational Amplifier Characteristics and Parameters - Inverting Amplifier - Non-Inverting Amplifier - Unity Follower - Summing Amplifier - Difference Amplifier - Differentiator, Integrator Using Op -Amp - Comparator.

**UNIT IV****(15 hrs)**

**Oscillators and Multivibrators:** Positive and Negative Feedback in Amplifier - Principle of Negative Voltage Feedback in Amplifier – Feedback Circuit - Gain of Negative Voltage Feedback Amplifier - Advantage of Negative Voltage Feedback in Amplifier – Oscillator Circuit – Positive Feedback Amplifier Oscillator – Barkhausen Criterion - Hartley, Colpitt's and Phase Shift Oscillators – Transistor Astable and Monostable Multivibrator.

**UNIT V****(15 hrs)**

**Communication System:** Radio Broadcasting – Transmission and Reception – Modulation – Types of Modulation – Amplitude Modulation – Modulation Factor – Analysis of Amplitude Modulated Wave – Sideband Frequencies in AM Wave – Transistor AM Modulator – Power in AM wave – Limitations of Amplitude Modulation – Frequency Modulation - Theory of FM – Demodulation – Essential of Modulation – A.M. Diode Detector – A.M. Radio Receivers – Types of A.M. Radio Receivers – Stages and Advantages of Superhetrodyne Radio Receivers – FM Receiver – Difference Between AM and FM Receivers.

**Text Book:**

V.K. Mehta, “Principles of Electronics”, S.Chand and Co., 11th Revised Edition, reprint 2013.

| Unit | Chapter | Section   | Page No.  |
|------|---------|---|---|
| I    | 5       | 5.14 - 5.19   | 66 – 71   |
|      | 6       | 6.8-6.11,6.18,6.20 - 6.23   | 87 – 93 , 101 – 108   |
|      | 17      | 17.15 – 17.18   | 460 – 462   |
|      | 18      | 18.18 , 18.20 – 18.23   | 487 – 489, 495 – 498  |
| II   | 8,      | 8.12, 8.17, 8.18  | 160 – 162, 165 – 167  |
|      | 9       | 9.2 - 9. 12   | 195 – 200, 206 – 210, 212 – 214                               |
|      | 10      | 10.4-10.7,10.9  | 242 – 245 , 247 – 248   |
|      | 19      | 19.1-19.6 , 19.8- 19.14   | 506 – 514, 516 – 517  |
| III  | 12      | 12.6, 12.9, 12.17, 12.18  | 312 – 313, 315 – 317 , 326 – 328                              |
|      | 25      | 25.1-25.8, 25.15-25.18, 25.20, 25.22 – 25.24,25.26,25.27, 25.32 – 25.35 , 25.39 | 664 – 671, 688 – 695, 698 – 699, 707 – 709,711 – 714, 717,719 |
| IV   | 13      | 13.1-13.5   | 335 – 338, 342 – 344,   |
|      | 14      | 14.3-14.7, 14.10-14.13  | 366 – 370, 372 – 378  |
|      | 18      | 18.10-18.13   | 476 – 482   |
| V    | 16      | 16 .1 – 16.22   | 411 – 423 , 426 – 427,430 ,437                                |

**Reference Books:**

1. Ubald Raj and Jose Robin, “Basic Electronics”, Indira Publication, Marthandam, First Edition, 2004.
2. B.L.Theraja, “Basic Electronic Solid State”, S.Chand and Com, NewDelhi, 2003.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme – B.Sc**

**Semester V**

**(2018-2021)**

**Core Course –XIII: Classical Mechanics (18UPHC53)**

**(For those who join from June 2018 and afterwards)**

**Credits : 4**

**Hours/Week : 4**

**Duration : 60 hrs**

**Int. Marks : 25**

**Ext. Marks : 75**

**Max. Marks : 100**

**Course Objectives:**

- To understand the concepts of Mechanics of a system of particles.
- To give an exposure on Lagrange's equations and their uses.
- To acquire knowledge on Hamilton's equations for simple system.
- To solve two body central force problems.
- To introduce the concept of variational principles and Lagrange's undetermined multipliers.

**Course Outcomes:**

1. Understand the basic difference between Newtonian Mechanics and Lagrangian Dynamics
2. Able to frame equation of motion for various system like simple pendulum using Lagrangian Dynamics
3. Develop the frame equation of motion for various system like Compound pendulum using Hamilton Dynamics
4. Familiarize with two body central force problem.
5. Acquire knowledge of variation principle and its application
6. Decipher the higher level concept in classical Mechanics While doing their post graduate.

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**UNIT I**

**(12 hrs)**

**Newtonian Mechanics :** Space and Time – Newton's Laws of Motion – Inertial Frames – Gravitational Mass – Mechanics of Particle: Conservation Laws – Conservation of Linear Momentum – Conservation of Angular Momentum – Conservation of Energy – Mechanics of a System of Particles – External and Internal Forces – Centre of Mass - Conservation of Linear Momentum – Conservation of Angular Momentum – Conservation of Energy.

**UNIT II**

**(12 hrs)**

**Lagrangian Dynamics :** Constraints – Generalized Coordinates – Principle of Virtual Work – D'Alemberts Principle – Lagrange's Equations from D'Alemberts Principle – Procedure for Formation of Lagrange's Equations – Newton's Equation of Motion from Lagrange's Equations – Simple Pendulum – Atwood's Machine – Compound Pendulum – Lagrange's Equations for L-C Circuit – Motion Under Central Force – Hamilton's Principle and Lagrange's Equations – Motion Under Gravity.



**UNIT III****(12 hrs)**

**Hamiltonian Dynamics:** Introduction – Generalized Momentum and Cyclic Coordinates – Conservation Theorems – Hamiltonian Function H and Conservation of Energy – Hamilton’s Equations - Hamilton’s Equations in Different Coordinate Systems – Harmonic Oscillator – Motion of a Particle in a Central Force Field – Charged Particle Moving in an Electromagnetic Field – Compound Pendulum.

**UNIT IV****(12 hrs)**

**Two Body Central Force Problem:** Reduction of Two Body Central Force Problem to the Equivalent One Body Problem – Central Force and Motion in a Plane – Equations of Motion Under Central Force and First Integrals – Differential Equation for an Orbit – Inverse Square Law Force – Kepler’s Laws of Planetary Motion and their Deduction – Stability of Orbit Under Central Force.

**UNIT V****(12 hrs)**

**Variational Principle:** Deduction of Hamilton’s Principle from Modified Hamilton’s Principle - Deduction of Hamilton’s Equations from Modified Hamilton’s Principle - Deduction of Lagrange’s Equations from Variational Principle for Non-Conservative Systems – Lagrange’s Equations of Motions for Non-Holonomic System – Physical Significance of Lagrange’s Multipliers – Examples of Lagrange’s Method of Undetermined Multipliers – Rolling Hoop on an Inclined Plane – Simple Pendulum.

**Text Book:**

J.C. Upadhyaya, “Classical Mechanics”, Himalaya Publishing House, Second Revised Edition, 2005 (Reprint -2017).

| UNIT | Chapter | Section   | Page No.                   |
|------|---------|---|----------------------------|
| I    | 1       | 1.1-1.7,1.7.8-a,b,c                                   | 1-17                       |
| II   | 2       | 2.3,2.3.1,2.3.2,2.4-2.6,2.7,2.8-<br>Ex 2,3,5,7,8,2.11 | 29-30,34-36,38-47,51-53,58 |
| III  | 3       | 3.1-3.7,3.7.1,3.7.2,3.7.4                             | 75-89                      |
| IV   | 4       | 4.1-4.7   | 103-116                    |
| V    | 5       | 5.5-5.9   | 147-153                    |

**Reference Books :**

1. Herbert Goldstein, “Classical Mechanics”, Narosa Publishing House, Second Edition Reprint, 2001.
2. Goldstein, Poole, Saftko, “Classical Mechanics”, Pearson Education, Third Edition, 2006.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester V**  
**(2018-2021)**

**Major Elective Course - II: Optoelectronics (18UPHO51)**  
**(For those who join from June 2018 and afterwards)**

|                          |                         |
|--------------------------|-------------------------|
| <b>Credits</b> : 3       | <b>Int.Marks</b> : 25   |
| <b>Hours/Week</b> : 4    | <b>Ext.Marks</b> : 75   |
| <b>Duration</b> : 60 hrs | <b>Max. Marks</b> : 100 |

**Course Objectives:**

- To impart the knowledge of Optoelectronics and Optoelectronic devices.
- To enable the students to understand the concepts of modern fiber optic communication system.
- To enable the students to be familiar with the Optical storage devices.
- To enable the students to learn the technique of light transmission.
- To enable the students to acquire knowledge on optical data storage devices.

**Course Outcomes:**

1. Analyze the fundamental concepts of optoelectronics.
2. Impart knowledge of Active and passive display device.
3. Able to analyze the physics behind semiconductor optoelectronics devices.
4. Develop the knowledge in transmission of light through fibers.
5. Acquired skill on different types of data storage devices.

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**UNIT I** **(12 hrs)**

**Photo Diodes:** Introduction - Electroluminescence Process - LED Materials – Fabrication of LED – Applications - Classification of Photo Detectors – Junction Photodiodes – PIN Photo Diodes – Frequency Response of Silicon Photodiodes – Performance of Photo Detectors – High Speed and Long Wavelength Photo Diodes - Applications.

**UNIT II** **(12 hrs)**

**Display Devices :** LCD- Display Devices – Active and Passive Display Devices – Liquid Crystals - Types of Liquid Crystals – General Features of Liquid Crystals – Various Modes of LCD Operation – Liquid Crystal Display System – TN-LCD – Merits and Demerits.

**UNIT III** **(12 hrs)**

**Modulation :** Modulation - Types of Modulation – Optical Modulators – Quantum Wells – Quantum Well Electro Absorption Modulators – Electro – Optic Effect – Electro Optic Phase Modulation - Electro Optic Amplitude Modulation - Optical Switching and Logic Device – Self Electro Optic Device (only).

**UNIT IV** **(12 hrs)**

**Fiber optic Communication:** Principles of Light Transmission in a Fiber - Signal Transmission in a Optical Fiber – Modes of Propagation – Types of Rays – Number of Modes Supported in a Fiber – Classification of Fibers – Transmission Characteristics of Fibers – Total Dispersion - Fiber Optic Communication – Fiber Amplifiers – Definitions - Fiber Optic

Communication Link – Soliton Based Coherent Optical Fiber Communication – Application in Computers – Advantages and Disadvantages of Fiber Optic Communication.

**UNIT V**

**(12 hrs)**

**Data Storage Devices:** Optical Storage Device – Disk Data Storage – Structure and Operating Principle of CD- ROM - Magneto - Optical Storage Systems – Data Storage and Retrieval Methods - Holographic Optical Data Storage – Storing and Retrieving Digital Data – Advantage of using Holography in Optical Data Storage Devices.

**Text Book:**

V.Rajendran, J. Hemalatha, M. Stalin Mano Gibson, “Semiconductor Physics and Optoelectronics”, Vikas Publishing House PVT LTD, 2004.

| <b>Unit</b> | <b>Chapter</b> | <b>Page No.</b>     |
|-------------|----------------|---------------------|
| I           | 5              | 89-95               |
|             | 6              | 97-110              |
| II          | 2              | 129-144             |
| III         | 1              | 173-195             |
| IV          | 1              | 171-173,<br>205-229 |
| V           | 2              | 293-308             |

**Reference Books:**

1. Dr.M.Arumugam, “Semiconductor Physics and Optoelectronics”, Anuradha publications, 2005.
2. Ray Tricker, “Opto Electronics and Fibre Optic Technology”, Elsevier Publishers, 2002.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme – B.Sc**

**Semester V**

**(2018-2021)**

**Major Elective Course - II: Astrophysics (18UPHO52)**

**(For those who join from June 2018 and afterwards)**

**Credits : 3**

**Int.Mark : 25**

**Hours/Week : 4**

**Ext. Marks : 75**

**Duration : 60 hrs**

**Max. Marks : 100**

**Course Objectives:**

1. To impart the knowledge of planetary motion to students.
2. To make the students to understand about stars.
3. To make students to understand nature of gravitating systems.
4. To make the students to understand about the cosmological models.
5. To enable the students to understand about the perturbation in universe.

**Course Outcomes:**

- Gained knowledge in planetary motion.
  - Enable to understand the formation of stars.
  - Acquired knowledge in cosmological models.
  - Understand perturbation in universe.
- 

**UNIT I**

**(12 hrs)**

Kepler's Law of Planetary Motion – Longitude of Perigee – Forward Motion of the Apse line – To Calculate the Eccentricity of the Earth's Orbit Around the Sun – Verification of the Kepler's Law in the Case of the Earth – Explanation of the Third Law – Newton's Deductions from Kepler's Laws – To Derive the Kepler's Third Law from the Newton's Law of Gravitation - To Find the Mass of the Planet – To Fix the Position of the Planet in the Elliptical Orbit – Mean Anomaly – Geocentric and Heliocentric Latitudes and Longitudes.

**UNIT II**

**(12 hrs)**

Introduction – Stellar Motion – Solar Motion – Distances of Star - Magnitudes of Star – Apparent, Visual and Photo Visual Magnitudes – Absolute Magnitudes – Relation Between Apparent and Absolute Magnitude – The Color and Size of the Star – Double and Multiple Star – Variable Star - Star Cluster – Constellations – Zodiacal Constellations – The Milky Way – The Winter Constellations - The Spring Constellations – The Summer Constellations.

**UNIT III**

**(12 hrs)**

Laws of Gravity – Newtonian Gravity – Spherical System – Newton's Theorem – Circular and Escape Speed – Useful Spherical Models – Collision Less Systems – Relaxation Time – Jeans Equation – the Virial Theorem – Applications of Virial Theorem – Spherical Collapse Model – Galaxy Cluster Mass to Light Ratio – Flat Rotation Curve Halos – Masses from Kinetic Tracers – the Oort Limit – Evolution of Gravitation System – Negative Specific Heats – Phase Mixing – Violent Relaxation – Dynamical Friction – Collision Between Galaxies – Tidal Stripping.

**UNIT IV****(12 hrs)**

Friedmann-Robertson-Walker Models (FEW Model) – Newtonian Cosmology – Solution of the Energy Equation – Asymptotic Behavior – the Density Parameter – the Cosmology Red Shift – the Horizon Problem – Cosmology with Pressure – Radiation Dominated Universe – Number of Quanta Per Horizon Volume – Curvature of Space-Time – Inflation – the Inflation Scenario – Chaotic Inflation – Distances in FRW Cosmologies – Scale Factor vs. Hubble Parameter – Red Shift vs. Comoving Distance – Angular Diameter and Luminosity Distances – Magnitudes and Distance Moduli – K-Correction.

**UNIT V****(12 hrs)**

Linear Cosmological Perturbation Theory – Perturbations of Zero Pressure Models – the Spherical ‘Top-Hat’ Perturbation – General Perturbations – Non-Zero Pressure and the Jeans Length – Matter Domination Era – Radiation Domination Era – Super Horizon Scale Perturbations – Isocurvature vs. Isentropic Perturbations – Diffusion Damping and Free Streaming – Scenarios – The Adiabatic Baryonic Model – The Hot Dark Matter Model – The Cold Dark Matter Model – Origin of Cosmological Structure – Spontaneous Generation of Fluctuations – Fluctuations from Inflation – Self Ordering Field – Domain Walls – Cosmic Strings.

**Text Books:**

- 1.S.Kumaravelu and SusheelaKumaravelu, “Astronomy”, A.BhaskaraSelvan Sivakasi , 2007.
2. Elements of Astrophysics by Nick Kaiser, 2002 (Online version).

| <b>Unit</b> | <b>Text Book No.</b> | <b>Chapter</b> | <b>Section</b>      | <b>Page No.</b>      |
|-------------|----------------------|----------------|---------------------|----------------------|
| I           | 1                    | VI             | 146-164             | 191 – 210            |
| II          | 1                    | XVIII          | 341-359 (iii)       | 565 – 594            |
| III         | 2                    | 25             | 25.1-27.6           | 287 – 300            |
| IV          | 2                    | 28,30          | 28.1-29.3,30.1-30.4 | 301 – 324, 329 - 335 |
| V           | 2                    | 31             | 31.1-32.3.2         | 337 – 367            |

**Reference Books:**

1. D.S. Mathur, Revised by Dr.P.S. Hemne, “Mechanics”, S .Chand and Company (PVT) Limited, Revised Edition 2012, Reprint 2014.
2. Basu , Baidyanath , “An Introduction to Astrophysics”, Prentice Hall India Learning (PVT) Limited, Second Edition 2010.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester V**  
**(2018-2021)**

**Major Elective Course - II: Programming in C++ (18UPHO53)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 4</b>      | <b>Ext. Marks</b> | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 60 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

1. To expose the students in object oriented programming.
2. To enrich the activities of physics through programming
3. To gain the knowledge in recent technology.
4. To have an exposure on the principles of heritance.
5. To effectively use the pointers.

**Course Outcomes:**

- Understand the basic concepts of C++ language.
- Enable to solve the problems in physics using C++ language.
- Acquire knowledge in principles of heritance
- Able to use the pointers in the C++ programs.

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**UNIT I** **(12 hrs)**

Principles of Object Oriented Programming – Basic Concepts of OOP – Object Oriented Languages – Applications of OOP – Introduction to C++ - Tokens, Keywords , Identifiers , Variables , Operators , Manipulators , Expressions and Control Structures in C++ - Simple Programs – Addition of two Numbers – Finding the Smallest and Biggest Among n Numbers – To Find the Displacement of a Particle.

**UNIT II** **(12 hrs)**

Function in C++ - Main Function – Function Prototyping – Call by Reference - Return by reference – Function Overloading – Friend and Virtual Functions – To Find the Relativistic Mass and Length of the Object.

**UNIT III** **(12 hrs)**

Classes and Objects: Fibonacci Series, Sum of Each Digit of a Number - Constructors and Destructors – Operators Overloading and Type Conversions – To Convert Binary to Equivalent Decimal Number.

**UNIT IV** **(12 hrs)**

Inheritance – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Calculation of Factorial of a Given Number - Hierarchical Inheritance – Hybrid Inheritance. Pointers, Virtual Functions and Polymorphism – Managing I/O Operations –To Find the Most Probable and rms Speed of n Particles.

**UNIT V****(12 hrs)**

Working with Files: Classes for File Stream Operations – Opening and Closing a File – End-of- File Deletion –File Pointers –Updating a File – Error Handling During File Operations – Command Line Arguments.

**Text Book:**

E.Balaguruswamy, “Object oriented programming in Turbo C++”, Tata McGraw-Hill, New Delhi, 2002

| <b>Unit</b> | <b>Chapter</b> | <b>Section</b>   | <b>Page No.</b>  |
|-------------|----------------|------------------|------------------|
| I           | 1              | 1.4-1.8          | 6-15             |
|             | 3              | 3.1-3.24         | 35-69            |
| II          | 4              | 4.1-4.5,4.9-4.10 | 77-82, 87-90     |
| III         | 5              | 5.16-5.19        | 130-135          |
|             | 7              | 7.3-7.8          | 173-195          |
| IV          | 8              | 8.1-8.3,8.6-8.7  | 201-210, 218-225 |
|             | 9              | 9.1-9.5          | 251-275          |
|             | 10             | 10.6             | 312-317          |
| V           | 11             | 11.2-11.10       | 325-317          |

**Reference Books:**

1. Herbert Schidt, “The Complete Reference C++”, Tata McGraw Hill, NewDelhi, Third Edition, 2001 Reprint.
2. R.Rajaraman, “Object Oriented Programming” New Age International, 2001Reprint.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc**  
**Semester V**  
**(2018-2021)**

**Skilled Based Course - II: Medical Physics (18UPHS51)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credit</b>     | <b>: 1</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 2</b>      | <b>Ext. Marks</b> | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 30 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To impart the knowledge of biomedical instrumentation.
- To give an exposure on use of transducers in medical instruments.
- To explain the working principle of modern instruments used as diagnostic tools.
- To have an in- depth knowledge in ECG recording systems.
- To appreciate the use of EEG recording and CT scanner.

**Course Outcomes:**

1. Develop medical physics methods and tools related to physics, radiation biology and radiation detection and computation in research setting.
2. Gain integrated knowledge in a specialized area in efforts to form a foundation for future research in medical physics.
3. Understand the principles and use of imaging devices and instrumentation.
4. Apply knowledge of X- rays systems and to analysis and compare the performance of the X-ray imaging system.
5. Learn many of the techniques from system that have proven useful in improving quality and safety in health care.

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**UNIT I** **(6 hrs)**

**Human Physiological system and Biopotential Electrodes:** Introduction – Cells and their Nature - Transport of Ions Through Cell Membrane - Resting and Action Potential – Bio Electric Potentials – Nerve Tissues and Organs - Design of Medical Instrumentation – Components of the Biomedical Instrument System – Electrodes - Types of Electrodes – Micro Electrodes –Depth and Needle Electrodes - Surface Electrodes.

**UNIT II** **(6 hrs)**

**Biopotential Transducers:** Transducers – Types of Transducers – Loading and Sensitivity Effect – Loading Effect and Sensitivity of Bridge – Strain Gauge - Photo Electric Type Resistive Transducer - Thermistors Type Transducers - Capacitive Transducers - Inductive Transducer – LVDT.



**UNIT III****(6 hrs)**

**Biosignal Acquisition :** Biosignal Analysis – Analog and Digital Methods – Signal to Noise Improvement – Amplitude Measurements – Analysis of Random Signals - Properties of Recording Systems – Electron Microscope – Scanning Electron Microscope - Digital Thermometer – X – Ray Machine.

**UNIT IV****(6 Hrs)**

**Biopotential Recorders:** Electrocardiography – ECG Lead Configuration – ECG Recording Setup – Practical Considerations for ECG Recording - Defibrillators – Internal and External Defibrillators.

**UNIT V****(6hrs)**

**Biomedical Instrumentation:** Electroencephalography - Modern EEG UNIT – Analysis of EEG – Electromyography – Recording Setup –Computer Tomography – Block Diagram of CT Scanner – Applications.

**Text Book:**

Dr.M.Arumugam, “Biomedical Instrumentation”, Anuradha publications, Kumbakonam, II Edition, 2010.

| Unit | Chapter | Section                              | Page No.                           |
|------|---------|--------------------------------------|------------------------------------|
| I    | 1       | 1.1 - 1.2, 1.4 - 1.7, 2.2 - 2.4.7    | 1 - 10 , 18 - 29                   |
| II   | 2       | 2.5 - 2.5.11, 2.5.13, 2.5.14, 2.5.15 | 33 - 57                            |
|      | 3       | 3.9 - 3.9.3, 3. 9.5                  | 99 - 103, 105 - 106                |
|      | 7       | 7.3 , 7.6, 7.9                       | 277 - 280 , 290, - 292 , 299 - 303 |
| IV   | 4       | 4.3 - 4.3.4                          | 117 -129                           |
|      | 5       | 5.5.                                 | 185 -195                           |
| V    | 4       | 4.4, 4.4.1, 4.4.4, 4.4.5, 4.5, 4.5.1 | 144 - 146 , 150 - 155              |
|      | 10      | 10.7                                 | 360 - 367                          |

**Reference Books :**

1. R.S. Khandpur, “Hand book of Biomedical Instrumentation”, Tata McGraw - Hill Ltd., New Delhi, 1999.
2. R.Anandanatarajan, “Biomedical Instrumentation and measurement”, PHI Learning Pvt, Ltd, 2010.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme - B.Sc**

**Semester V**

**(2018-2021)**

**Skilled Based Course - III: Energy Physics- I (18UPHS52)**

**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credit</b>     | <b>: 1</b>      | <b>Int. Marks</b> | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 2</b>      | <b>Ext. Marks</b> | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 30 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To gain knowledge of various energy resources.
- To get an exposure on applications of solar energy.
- To know the methods of extraction energy of wind energy.
- To learn about methods of producing biomass energy.
- To understand geothermal energy.

**Course Outcomes:**

1. Evaluate the role of different energy sources in today and future energy supply.
2. Understand the availability of biomass in different area and weather condition and their potential attributes to biofuels production.
3. Gain knowledge in sustainable energy.
4. Compare the benefits and drawbacks of different energy resources and technologies such as wind, geothermal, solar and biomass.
5. Measure and evaluate different solar energy technologies through the physical function of the devices.

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**UNIT I**

**(6 hrs)**

**Energy Resources:** Introduction – Classification of Energy Resources – Energy Chain Common Forms of Energy – Advantages and Disadvantages of Conventional Energy Sources – Salient Features of Non-Conventional Energy Sources – World Energy Status – Energy Scenario in India - Green House Effect – Consequences of Global Warming – Pollution - Various Pollutants and their Harmful Effects.

**UNIT II**

**(6 hrs)**

**Solar Energy And Solar Thermal System :** Introduction to Solar Energy – Sun, Earth Radiation Spectrums – Measurement of Solar Radiation Data – Solar Collectors: Liquid Flat Plate Collector – Flat Plate Air Heating Collector –Evacuated Tube Collector - Solar Cooker - Solar Cell, Module, Panel and Array Configuration.

**UNIT III**

**(6 hrs)**

**Wind Energy:** Introduction to Wind Energy – Origin of Winds – Major Applications of Wind Power –Energy Available in Wind – Power Extraction from Wind – Wind Turbine Types– Components of Horizontal Axis Wind Turbine (HAWT) and Vertical Axis Wind Turbine (VAWT).

**UNIT IV****(6 hrs)**

**Biomass Energy:** Introduction to Biomass Energy – Usable form of Biomass – Biomass Resources - Biomass Conversion Technologies – Biomass Gasification – Down Draft Type – Various Stages from Anaerobic Digestion Process - Advantage of Anaerobic Digestion- Classification of Biogas Plants - Floating Drum and Fixed Dome Type Biogas Plants.

**UNIT V****(6 hrs)**

**GeoThermal Energy :** Introduction to Geothermal Energy – Applications of Geothermal Energy – Origin and Distribution of Geothermal Energy – Types of Geothermal Resources – Hydro Thermal Resources - Vapor Dominated Steam – Liquid Dominated System - Environmental Consideration – Geothermal Energy in India.

**Text Book:**

B.H. Khan, “Non – Conventional Energy Resources”, McGraw Hill Education (India) private limited, Seventeenth reprint, 2014.

| Unit | Chapter | Section   | Page No.                                       |
|------|---------|---|--|
| I    | 1       | 1.3 , 1.6 - 1.9 , 1.10.3 - 10.6.1, 1.13 - 1.14          | 2 - 13 , 15 - 27                               |
| II   | 4       | 4.1 , 4.3 ,4.7  | 83 - 85 , 89 - 91                              |
|      | 5       | 5.1.4 ,5.1.6 ,5.1.7 , 5.6                               | 118 - 120 , 124 - 126 , 137 - 140 ,            |
|      | 6       | 6.4   | 177 - 182                                      |
| III  | 7       | 7.1.1, 7.1.2, 7.4,7.6.1,7.6.2, 7.7 - 7.7.2              | 198 to 199 , 204 to 205 , 208 - 212, 218 - 225 |
| IV   | 8       | 8.2 - 8.4, 8.6, 8.6.1, 8.9, 8.9.3, 8.9.4, 8.9.7 , 8.9.8 | 244 - 252 , 255 - 257 , 263 - 266 , 277 - 276  |
| V    | 9       | 9.1 – 9.3, 9.3.1, 9.6 , 9.7                             | 288 - 296, 306 - 308                           |

**Reference Books:**

1. G.D. Rai, “Solar Energy Utilization”, Khanna Publishers, Delhi , V Edition, 1995
2. A.K.Agarwal, “Non – Conventional Energy systems” , A.P.H Publishing Corporation, 2005.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme – B.Sc**

**Semester VI**

**(2018-2021)**

**Core Course - XIV: Condensed Matter Physics (18UPHC61)**

**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 5</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 5</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 75 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To be familiar with different types of bonding in solids.
- To acquire knowledge in different types of crystal and X – crystal analysis.
- To give an exposure on theory and applications of superconductor.
- To be familiar with the origin of different types of magnetic materials.
- To acquire sufficient knowledge in dielectric materials and its applications.

**Course Outcomes:**

12. Gained knowledge in the basic concepts of Condensed Matter Physics.
13. Familiarize with types of bonding and theories of specific heat capacity.
14. Evaluate various types of crystal structure and X-ray diffraction techniques.
15. Enable to understand the concept of occurrence of superconductivity.
16. Analyze different types of magnetic materials dielectric materials and its applications.
17. Analyze different types dielectric materials and its applications.
18. Enable to solve problems in condensed matter physics.

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**UNIT I** **(15 hrs)**

**Bonding in solids** : Introduction – Forces Between the Atoms – Variation of Interatomic Force with Interatomic Spacing – Cohesive Energy – Types Bonds in Crystal – Ionic Bonding – Cohesive Energy of Ionic Solids – Covalent Bonding – Metallic Bonding - Hydrogen Bonding - Vander Waals Bonding – Specific Heat of Solid - Classical Theory – Einstein Theory of Specific Heat Capacity – Debye’s Theory ( No Derivation ) .

**UNIT II** **(15 hrs)**

**Crystal Structure** : Crystal Lattice - Seven Classes of Crystals - Simple Cubic Structure – Body Centered Cubic Structure – Close Packed Structures - Other Cubic Structure – Directions in Crystals - Planes in Crystal - Miller Indices – Distance of Separation Between Successive (hkl) Planes - Diffraction of X – Ray by Crystals – Experimental Methods of X – Ray Diffraction.

**UNIT III** **(15 hrs)**

**Classical theory of conduction - Superconductors** : Classical Theory of Electrical Conduction – Sources of Resistance - Superconductors – General Properties – Effect of Magnetic Field – Effect of Current - Thermal Properties – Isotope Effect - Type I and Type II Superconductors – Explanation for the Occurrence of Superconductivity BCS Theory – Applications of Superconductors.

**UNIT IV****(15 hrs)**

**Magnetic properties :** Introduction - Different Types of Magnetic Materials - Classical Theory of Diamagnetism - Langevin's Theory of Paramagnetism - Weiss Theory of Paramagnetism – Ferromagnetism – Domain Theory of Ferromagnetism – Hysteresis – Hard and Soft Magnetic Materials.

**UNIT V****(15 hrs)**

**Dielectric properties :** Introduction - Fundamental Definitions – Electronic Polarization - Ionic Polarization – Orientational Polarization – Space-Charge Polarization – Frequency Effect on Polarization – Temperature Effect on Polarization - Dielectric Loss - Local Field or Internal Field - Clausius-Mosotti Relation - Dielectric Breakdown – Properties of Different Types of Insulating Materials - Important Applications of Dielectric Materials .

**Text Book:**

P.K.Palanisany, “Solid State Physics”, Scitech Publications (India) Pvt., Ltd., 2006.

| Unit | Chapter | Section               | Page No.                 |
|------|---------|-----------------------|--------------------------|
| I    | 6       | 6 ( Full )            | 6.1 – 6.21               |
|      | 7       | 7.1, 7.3.1 , 7.3.2    | 7.5 – 7. 11              |
| II   | 1       | 1 (Full)              | 1.1 – 1.28               |
|      | 2       | 2.1 – 2.3             | 2.1 - 2.9                |
| III  | 8       | 8.1 - 8.6, 8.9 -8.12  | 8.1 – 8.8, 8.14 – 8.20   |
| IV   | 4       | 4.1 - 4.6, 4.8        | 4.1 – 4.20 , 4.25 – 4.30 |
| V    | 5       | 5.1 – 5.7 , 5.9, 5.10 | 5.1 – 5.14, 5.17 – 5.29  |

**Reference Books :**

1. Kittel, “ Introduction to Solid State Physics” , Wiley and Sons, 7<sup>th</sup> Edition.
2. Saxena, Gupta Saxena, “ Fundamentals of Solid State Physics” , Pragathi Publisher, Meerut, 2009.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme - B.Sc**

**Semester VI**

**(2018-2021)**

**Core Course - XV: Nuclear Physics (18UPHC62)**

**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 5</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 5</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 75 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To learn the physical properties of a nucleus.
- To understand the radioactive disintegration laws.
- To give an exposure on nuclear decay process.
- To acquire knowledge on nuclear stability and nuclear reactions.
- To be familiar with nuclear detectors and particle physics.

**Course Outcomes:**

1. Gained knowledge in different Nuclear Models.
2. Familiarize with half life and mean life period of radioactive elements.
3. Understand the importance of applications of radio-isotopes.
4. Able to recognize the need of nuclear power plants.
5. Analyze the various types of electrostatic accelerators.
6. Apply quark models to analyze weak interactions such as beta decay and Kaon decay.

**UNIT I (15 hrs)**

**Nuclear Structure And Nuclear Models:** Properties of Nuclei – Size and Structure of Nuclei – Nuclear Stability – Nuclear Spin and Magnetic Moment – Nuclear Magnetic Resonance and Magnetic Resonance Imaging – Binding Energy and Nuclear Forces – Nuclear Models – Liquid Drop Model – Independent - Particle Model – Collective Model - Radioactivity – Decay Process – Alpha Decay – Beta Decay – Gamma Decay – Natural Radioactivity – Four Radioactive series – Determining the Age of the Earth.

**UNIT II (15hrs)**

**Radio Elements :**Rutherford and Soddy's Theory of Radioactive Disintegration – Average or Mean life of a Radioelement – Half Life Period – Determination of Decay Constant and Half Life – Soddy's Displacement Law – Example Problems (1 - 9) - Interaction of Particles with Matter – Heavy Charged Particles – Electrons – Photons – Radiation Damage in Matter – Uses of Radiation – Tracing – Neutron Activation Analysis – Radiation Therapy – Food Preservation.

**UNIT III (15 hrs)**

**Nuclear Reaction and Nuclear Reactors:** Nuclear Reactions – Reaction Cross Section – Interactions Involving Neutrons - Nuclear Fission – Nuclear Reactors - Neutron Leakage – Regulating Neutron Energies – Neutron Capture – Control of Power Level - Safety and Waste

**18UPH58**

Disposal – Nuclear Fusion – Fusion Reactions – Magnetic Field Confinement – Inertial Confinement – Fusion Reactor Design – Advantages and Problems of Fusion – Kudankulam Nuclear Power Project (KKNPP) – Safety Features of Kudankulam Nuclear Power Plant – Advanced Safety Features of Kudankulam Nuclear Power Plant.

**UNIT IV (15 hrs)**

**Particle Accelerators:** Introduction – Electrostatic Accelerators – Van de graaff Generator – Linear Accelerator (LINAC) - Cyclotron – Synchro Cyclotron – Betatron – Electron Synchrotron – Proton Synchrotron (Bevatron) – Ionization Chamber – Proportional Counter - G.M Counter – Scintillation Counter – Cloud Chamber – Bubble Chamber – Nuclear Emulsion Techniques.

**UNIT V (15 hrs)**

**Elementary Particles:** The Fundamental Forces in Nature – Positrons and other Antiparticles – Mesons and the beginning of Particle Physics – Classification of Particles - Hadrons – Leptons – The Solar Neutrino Mystery and Neutrino Oscillations - Conservation Laws – Baryon Number - Lepton Number – Strange Particles and Strangeness – Resonance Particles – Energy Considerations in Particle Production – The Eightfold way – Quarks.

**Text Books:**

1. Serway, Moses and Moyer, “Modern Physics”, Cengage Learning, Third edition, 2005.
2. Satya Prakash, “Nuclear Physics and Particle Physics”, Sultan Chand and Sons- Educational Publishers, New Delhi, First Edition, 2005.
3. Kudankulam Nuclear Power Project, “Nuclear energy Safe, Clean and Green energy”, NPCIL India 2013.

| Unit | Text Book No. | Chapter | Section  | Page No.  |
|------|---------------|---------|--|---|
| I    | 1             | 13      | 13.1 – 13.6  | 444-476   |
| II   | 2             | 3       | 3.4 – 3.8, Ex.1 – Ex.9   | 136-140,154-158                                 |
|      | 1             | 14      | 14.7 – 14.8, 14.10   | 504-510,514-516                                 |
| III  | 1             | 14      | 14.1 – 14.6  | 484-504   |
|      | 3             | -       | -  | 14-24   |
| IV   | 2             | 10      | 10.1 – 10.3, 10.5 – 10.8, 10.10, 10.11, 10.13 – 10.6, 10.16, 10.19 –10.21. | 376-377,378-382,384-391,394-399,401-409,414-420 |
| V    | 1             | 15      | 15.1 – 15.9  | 525-553   |

**Reference Books:**

1. Arthur Beiser, “Concepts of Modern Physics”, Tata McGraw Hill, Sixth Edition, 2004.
2. Irvin Kaplan, “Nuclear Physics”, Narosa Publishing House, New Delhi, 1998.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme - B.Sc**

**Semester VI**

**(2018-2021)**

**Core Course - XVI: Digital Electronics (18UPHC63)**

**(For those who join from June 2018 and afterwards)**

**Credits : 4**

**Hours/Week : 4**

**Duration : 60 hrs**

**Int.Marks :25**

**Ext. Marks :75**

**Max. Marks :100**

**Course Objectives:**

- To improve the applied knowledge of electronics.
- To gain the knowledge of modern updated electronic technology.
- To learn about various registers and counters.
- To enable the knowledge of flip-flops and 555 Timer.
- To have the exposure on registers and counters.

**Course Outcomes:**

1. Understand the application of digital devices /circuits.
2. Able to solve problem in digital electronics using K-map.
3. Construct various digital circuit like multipliers adders.
4. Enable to design simple memory circuits.
5. Analyze the use of various registers in the field of communication.

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**UNIT I**

**(12 hrs)**

Number System – Binary Number System – Binary to Decimal Conversion – Decimal to Binary Conversion - Octal Numbers - Hexa Decimal Numbers – ASCII Code – Excess-3 Code – Gray Code – Binary Addition - Binary Subtraction by 1's Complement and 2's Complement – Binary Multiplication and Division – Boolean Laws and Theorems – Principle of Duality – De'Morgans Theorems and their Proof.

**UNIT II**

**(12 hrs)**

Logic Gates – NOT, OR, AND – Universal Gates – NOR, NAND, AND-OR-Invert Gates – Positive and Negative Logic – Sum of the Product Method – Truth Table to K- map – Pairs , Quads,and Octets – K- map Simplifications - Don't Care Conditions - Product of Sum Method – Product of Sum Simplifications.

**UNIT III**

**(12 hrs)**

Arithmetic Building Blocks - Half Adder – Full Adder – Adder - Subtractor - Multiplexers –16-to-1 Multiplexer - Nibble Multiplexers - Demultiplexers – 1-of-16 Decoder – BCD to Decimal Decoders - 7 Segment Decoders – Encoders – Decimal - to- BCD Encoder - Parity Generators – Checkers.

**UNIT IV**

**(12 hrs)**

RS Flip-Flop – Gated Flip-Flops – Edge-Triggered RS Flip-Flop – Edge Triggered D Flip Flop – Edge-Triggered JK Flip flop - Flip-Flop Timing – JK Master Slave Flip Flop – Schmitt Trigger – IC 555 Timer Astable and Monostable Multivibrators.

**18UPH60**



**UNIT V****(12 hrs)**

Register – Types of Registers – Serial in - Serial Out (SISO) – Serial in Parallel Out – Applications of Shift Registers - Counters – Asynchronous Counter- Synchronous Counter – MOD Counter (Mod 3, Mod 5 Counters Only) – Counter Design as a Synthesis Problem.

**Text Book:**

Albert Paul Malvino, Donald P. Leach and Goutam Saha “Digital Principles and Applications”, Tata McGraw Hill, NewDelhi, Ninth Reprint, 2017.

| <b>Unit</b> | <b>Chapter</b> | <b>Section</b>       | <b>Page No.</b>                 |
|-------------|----------------|----------------------|---------------------------------|
| I           | 5              | 5.1-5.10             | 182-206                         |
|             | 6              | 6.1,6.2,6.5,6.6,6.11 | 220-225,229-238,250             |
|             | 3              | 3.1                  | 76-79                           |
| II          | 2              | 2.1-2.4              | 41-46,49-52,58-61               |
|             | 3              | 3.2-3.8              | 84-102                          |
| III         | 6              | 6.7-6.8              | 239-244                         |
|             | 4              | 4.1-4.6,4.8          | 129-151,154,155                 |
| IV          | 8              | 8.1-8.6,8.8          | 284-299,301-302                 |
|             | 7              | 7.3-7.5              | 263-270                         |
| V           | 9              | 9.1-9.3,9.7          | 321-328,338-349                 |
|             | 10             | 10.1,10.3,10.4,10.7  | 358-362,365-370,373-381,392-395 |

**Reference Books :**

1. Willam H.Gothmann , “Digital electronics an introduction to theory and practice” , prentice hall of India pvt ltd, New Delhi, Second Edition,2000.
2. Virendhra Kumar, “ Digital Electronics Theory and Experiments”, New Age International Publishers, NewDelhi, 2002.
3. S.Salivahanan,S.Arivazhagan,“Digital Circuit and Design”,Vikas Publishing House PVT Limited ,2000.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme - B.Sc**

**Semester VI**

**(2018-2021)**

**Core Course - XVII: Major Physics Practical- III (18UPHC6P)**

**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 6</b>      | <b>Int.Marks</b>  | <b>: 40</b>  |
| <b>Hours/Week</b> | <b>: 3 + 3</b>  | <b>Ext.Marks</b>  | <b>: 60</b>  |
| <b>Duration</b>   | <b>: 90 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To determine the refractive index of the given liquid by using hollow prism.
- To determine the wavelength of different colours in the visible spectrum.
- To find the self inductance of the coil by using AC bridge.
- To calculate the value of Boltzmann constant by using BJT.
- To determine the capacitance of unknown capacitor by constructing of AC bridge.

**Course Outcomes:**

1. Able to calculate the refractive index of different liquids by using hollow prism.
2. Capable of determining the wavelength of the different colours in visible spectrum.
3. Familiar with measuring the self-inductance of the coil by constructing AC bridges.
4. Ability to calculate the value of Boltzmann constant by using BJT.
5. Able to calculate the capacitance of unknown capacitor by constructing Wien's bridge.
6. Capable to determine the value of high Resistance by using Spot Galvanometer.

- 
1. Spectrometer – Refractive Index of the Liquid Using Hollow Prism – Minimum Deviation.
  2. Spectrometer –  $i-i'$  Curve.
  3. Spectrometer – Grating - Minimum Deviation Method.
  4. Spectrometer – Cauchy's Constant.
  5. Rayleigh Bridge – Self Inductance.
  6. Spectrometer - Hartmann's Interpolation.
  7. LCR – Series Resonance Circuit.
  8. LCR – Parallel Resonance Circuit.
  9. Anderson's Bridge – Self Inductance.
  10. Maxwell's Bridge – Self Inductance.
  11. Wien's Bridge –  $C_1/C_2$  and to Find Un-Known C.
  12. Impedance & Power Factor LR Circui.T.
  13. Impedance & Power Factor CR Circuit.
  14. Boltzmann's Constant Using Transistor.
  15. Spot Galvanometer- High Resistance By Leakage.
  16. Absorption Coefficient Of Transparent Solid.

### **Reference Book**

M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, “A Textbook of Practical Physics”, Sultan Chand & Sons educational Publishers, NewDelhi, First edition 1990, Reprint: 2011.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme - B.Sc**

**Semester VI**

**(2018-2021)**

**Core Course - XVIII: Major Physics Practical - IV (18UPHC6Q)**

**(For those who join from June 2018 and afterwards)**

**Credits : 6**

**Int.Marks : 40**

**Hours/Week : 3 + 3**

**Ext.Marks : 60**

**Duration : 90 hrs**

**Max. Marks : 100**

**Course Objectives:**

- To construct binary adder circuits and to verify binary addition.
- To construct ring counter and shift register by using IC-7473.
- To construct logic gates by using discrete components and to prove NAND , NOR gates are universal gates.
- To construct rectifier with different filter circuits and to regulate output d.c. voltage.
- To study the characteristics of BJT transistor in CE mode and the characteristics of Zener diode in both forward and reverse bias.
- To construct multivibrator and oscillator circuits.

**Course Outcomes:**

19. Capable of constructing binary adder and subtractor circuits.
20. Ability to construct different MOD counter circuits and to understand the applications of register circuits in the field of communication.
21. Familiarize with applications of junction diode, Zener diode and IC voltage regulators.
22. Gained knowledge in CE mode transistor characteristics will provide key ideas to construct different amplifier circuits.
23. Ability to generate different wave shapes using multivibrator and oscillator circuits.
24. Thorough knowledge in handling modern electronics practical equipments.

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1. Zener Diode - Reverse Bias Characteristics and voltage regulation
  2. Transistor Characteristics - C. E. Mode
  3. Bridge Rectifier - LC and  $\pi$  filters
  4. Integrator and Differentiator using discrete components
  5. Hartley Oscillator - Frequency and inductance of pair of coils
  6. Colpitt's Oscillator - Frequency and inductance of a coil
  7. Astable Multivibrator - Discrete components
  8. Logic Gates  
(AND, OR, NOT, NAND, NOR) - Discrete components
  9. Dual power supply - IC 7812 and IC 7912
  10. Astable Multivibrator - IC 555
  11. Shift Register
  12. Four bit binary adder
  13. Ring Counter

- 14. Integrator and Differentiator - IC 741
- 15. Adder and Subtractor - IC 741
- 16. Universality of NAND & NOR gate - IC 7400 & IC 7402

**Reference Books:**

- 3. Virendhra Kumar, “Digital Electronics : Theory and Experiments”, New Age International Publications, 2015.
- 4. C.L.Arora, “B.Sc. Practical Physics”, S.Chand and Co, NewDelhi, 2010.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme – B.Sc**

**Semester VI**

**(2018-2021)**

**Major Elective Course - III: Nanotechnology and Instrumentation (18UPHO61)**

**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 4</b>      | <b>Ext. Marks</b> | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 60 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To impart the basic knowledge in Nanomaterials.
- To make the students to understand the various methods of synthesis of Nanomaterials.
- To give some ideas to students about characterization techniques of Nanomaterials.
- To make students to understand the quantum behavior of Nanomaterials.
- To give an exposure to students on some applications of nanotechnology.

**Course Outcomes:**

1. Understand the need of nanometer-sized devices.
2. Able to synthesis nanoparticles by simple methods.
3. Analyze the structure of nanomaterials.
4. Familiarize with basic knowledge of quantum nanostructures.
5. Enhance the interest for pursuing research in the field of nanotechnology.
6. Able to understand the various applications of nanotechnology.

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**UNIT I** **(12 hrs)**

**Quantum Mechanics For Nanoscience:** Introduction – Size Effects in Smaller System: Pre-Quantum –Energy Band Structure - Density of States at Low Dimensional Structures – Electron Conduction in Metals – Classical Theory - The Drude Model – Quantum Theory - Free Electron Model – Conduction in Insulators/Ionic Crystals.

**UNIT II** **(12 hrs)**

**Nanofabrication:** Top-Down Fabrication Methods – Arc Discharge Method – Laser Ablation Method – Ball Milling – Inert Gas Condensation – Bottom-up Fabrication Methods- Homogenous Nucleation – Chemical Vapour Deposition - Molecular Beam Epitaxy.

**UNIT III** **(12 hrs)**

**Nano Characterization:** Introduction - X-Ray Diffraction - Principle and Theory – X-Ray Diffraction Analysis - Scanning Electron Microscope - Principle – Construction and Working – Characterization Mechanism – Transmission Electron Microscope – Principle - Construction and Working - Characterization Mechanism -Scanning Tunneling Microscope - Principle- Construction and Working – Operation Modes.

**UNIT IV** **(12 hrs)**

**Metal Nanoclusters:** Introduction – Magic Numbers – Theoretical Modeling of Nanoparticles – Geometric Structure – Electronic Structure – Reactivity – Fluctuations – Magnetic Clusters – Bulk to Nano Transition – Preparation of Quantum Nanostructures – Size Effects – Conduction Electrons and Dimensionality.

**UNIT V****(12 hrs)**

**Carbon Nanotubes** –Structure and Types of Carbon Nanotubes – Properties of CNT – Growth of CNT – Electronic Applications (Nanoelectronics) – Nanocircuits – Carbon Nanotubes Inter Connects - Carbon Nanotubes Field Effect Transistor – Nanoscale Silicon Photonic Crystal – Optical Applications (Nanophotonics).

**Text Books :**

1. K. K. Chattopadhyay and A. N. Banerjee, “Introduction to Nanoscience and Nanotechnology”, PHI Learning and private limited, 2012.
2. Dr.M.A.Shah and Dr.M.A.Shah “Nanotechnology The science of small”,Wiley India Pvt Ltd, New Delhi, 2013.
3. Charles P. Poole Jr. and Frank J. Owens, “Introduction to Nanotechnology”, Wiley Interscience, John Wiley and Sons publication, 2003.

| Unit | Text Book No. | Chapter | Section  | Page No.                  |
|------|---------------|---------|--|---------------------------|
| I    | 1             | 5       | 5.1,5.2  | 72 – 76                   |
|      |               | 3       | 3.2,3.3,   | 36 – 46                   |
|      |               | 4       | 4.1,4.2  | 48 – 54                   |
| II   | 2             | 4       | 4.1 - 4.4 (4.4.1 - 4.4.4)  | 62 - 78                   |
| III  | 2             | 5       | 5.6, 5.1 - 5.2 (5.2.1 - 5.2.3), 5.3 (5.3.1 - 5.3.3), 5.4 (5.4.1 - 5.4.3) | 104 -107, 84 -89, 91 - 98 |
| IV   | 3             | 4       | 4.2  | 72 – 89                   |
|      |               | 9       | 9.2 , 9.3 , 9.3.1, 9.3.2   | 227 – 234                 |
| V    | 2             | 2       | 2.7 (2.7.1 - 2.7.3 )   | 36 – 43                   |
|      |               | 6       | 6.6 , 6.9  | 127 – 132                 |

**Reference Books :**

1. A.K.Bandyopadhyay, “Nano Materials”, New Age International Publishers, New Delhi, 2012.
2. S.Shanmugam, “Nanotechnology”, MJP Publishers, Chennai, 2010.

**Sri Kaliswari College (Autonomous) , Sivakasi**

**Department of Physics**

**UG Programme – B.Sc**

**Semester VI**

**2018-2021**

**Major Elective Course - III: Microprocessor Fundamentals (18UPHO62)**

**(For those who join from June 2018 and afterwards)**

**Credits : 3**

**Int.Marks : 25**

**Hours/Week : 4**

**Ext.Marks : 75**

**Duration : 60 hrs**

**Max. Marks : 100**

**Course Objectives:**

- To learn microprocessor and its architecture.
- To learn and write programs in assembly language.
- To understand arithmetic and logic operations of 8085.
- To effectively make use of registers and time delays routines.
- To update their knowledge on present day microprocessors.

**Course Outcomes:**

1. Familiarity with the microprocessor memory UNIT.
2. Ability to execute a simple program.
3. Familiarity with the looping, Counting, and indexing.
4. Knowledge developed in code conversion.

---

**UNIT I (12 hrs)**

Microprocessor 8085 Bus Organization – 8085 Registers and Externally Controlled Options – Memory Map and Addresses – Input and Output Devices – 8085 Architecture.

**UNIT II (12 hrs)**

8085 Programming Model – Instruction Classification – Instruction Set – Instruction Data Format and Storage – OP Code Format - Data Format – To Write, Assemble and Execute Simple Programs.

**UNIT III (12 hrs)**

Arithmetic Operations – Logic Operations – Branching, Looping - Data Transfer - 16 Bit Arithmetic Instructions – Memory Transfer.

**UNIT IV (12 hrs)**

Time Delay Using Registers – Additional Techniques – Counter Design with Time Delay – Program Use of Stack Pointer – Program Using Subroutine.

**UNIT V (12 hrs)**

Microprocessor Historical Perspective – 8085 Assembly Language – High Level Languages Operating System – 32 Bit Processors (80386 / 80486) - Intel i3, i5, i7 core – 8051 Micro Controller.



**Text Book :**

Ramesh Gaonkar, “Microprocessor Architecture programming and application with the 8085”, Penram International Publishing, Sixth edition, 2013.

| <b>Unit</b> | <b>Chapter</b> | <b>Section</b>   | <b>Page No.</b>                            |
|-------------|----------------|--|--|
| I           | 3              | 3.1.1, 3.1.3, 3.2.2, 3.3 to 3.3.2, 3.1                 | 59 - 61, 62 - 63 69 - 70, 80 - 81, 58      |
| II          | 2              | 2.1 to 2.4   | 32 - 46                                    |
| III         | 6              | 6.2 to 6.3.3, 6.4 to 6.4.5, 7.1 to 7.1.2, 7.2 to 7.2.3 | 186 - 199, 204 - 210, 228 - 230, 232 - 236 |
| IV          | 8              | 8.1 8.4  | 276 - 290                                  |
| V           | 1, 18          | 1.1.1, 1.2.3, 1.2.6,1.2.7,                             | 8,15 - 161, 17 - 19,                       |
|             |                | 18.4.1, 18.4.3, 18.5.1                                 | 620 - 624, 625 - 626, 629 - 630            |

**Reference Books:**

1. A.K.Mukhopadhyay, “Microprocessor Microcomputer and their applications”, Narosa Publishing house, 2005.
2. Mohamed Rafiqzaman, “Microprocessor and Micro Computer Based System”, Universal Book Stall, New Delhi, 2001.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme – B.Sc**

**Semester VI**

**(2018-2021)**

**Major Elective Course - III: Electronic Communication (18UPHO63)**

**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 4</b>      | <b>Ext. Marks</b> | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 60 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

1. To understand the concepts of Electronic Communication.
2. To understand the different types of modulation.
3. To understand the basic concepts of broadband communication system.
4. To impart the basic skills to solve the problems in Electronic Communication

**Course Outcomes:**

- Utilize the basic knowledge in electronics in the field of communication.
- Ability to design and conduct experiments as well as to analyze and interpret data.
- Ability to identify and prevent various hazards and timing problems in a digital design.
- Ability to understand the different types of modulation.

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**UNIT I**

**(12 hrs)**

Communications – Information – Transmitter – Channel - Noise – Receiver – Modulation – Need for Modulation – Bandwidth Requirements – Sine Wave and Fourier Series Review – Frequency Spectra of Nonsinusoidal Waves – Amplitude Modulation – Theory Frequency Spectrum of the AM Wave – Representation of AM – Power Relations in the AM Wave.

**UNIT II**

**(12 hrs)**

Evolution and Description of SSB – Suppression of Carrier – Suppression of Unwanted Sideband – The Filter System – The Phase Shift Method – Theory of Frequency and Phase Modulation – Description of Systems – Mathematical Representation of FM – Frequency Spectrum of the FM wave – Phase Modulation – Intersystem Comparisons – Generation of Frequency Modulation – FM Methods – Direct Methods.

**UNIT III**

**(12 hrs)**

Pulse Communications – Information Theory – Information in a Communications systems – Coding – Noise in an Information-Carrying Signal – Pulse Modulation – Types – PAM – PTM – PWM – PPM – PCM – Pulse Systems – Telegraphy – Telemetry.

**UNIT IV**

**(12 hrs)**

Digital Communications – Digital Technology – Digital Fundamentals – The Binary number system – Digital Electronics – The Emergence of the Data Communications Systems – Characteristics of Data Transmission Circuits – Digital Codes – Error Detection and Correction – Modem Classification – Modem Interfacing – Interconnection of Data Circuits to Telephone Loops.

**UNIT V****(12 hrs)**

Broadband Communications Systems – Multiplexing – Frequency-Division Multiplex - Time-division multiplex – Short and Medium Haul Systems – Coaxial Cables – Fiber Optic Links – Microwave Links – Tropospheric Links – Long Haul Systems – Submarine Cables – Satellite Communications – Routing Codes and Signaling Systems – Telephone Systems and Routing – Miscellaneous Practical Aspects – Introduction to Traffic Engineering.

**Text Book:**

Kennedy and Davis,” Electronic communications systems”, Tata McGraw Hill Publishing Company Limited, New Delhi, Fourth Edition 2002

| <b>Unit</b> | <b>Chapter</b> | <b>Section</b>   | <b>Page No.</b>    |
|-------------|----------------|------------------|--------------------|
| I           | 1              | 1.1 – 1.4.2      | 1 – 11             |
|             | 3              | 3.1 – 3.1.3      | 35 - 42            |
| II          | 4              | 4.1 – 4.3        | 57 - 69            |
|             | 5              | 5.1 – 5.1.5, 5.3 | 80 – 92 , 100 -103 |
| III         | 13             | 13.1 – 13.3.2    | 485 - 512          |
| IV          | 14             | 14.1 – 14.3.3    | 517 - 553          |
| V           | 15             | 15.1 – 15.4.4    | 562 -595           |

**Reference Books:**

1. Dennis Roddy, John Coolen, “Electronic Communications”, Prentice Hall of India Products,Fourth Edition,1995.
2. Ubald Raj and Jose Robin, “Basic Electronics”, Indira Publication, Marthandam, First Edition ,2004.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme –B.Sc**  
**Semester VI**  
**(2018-2021)**

**Value Based Course-II: Physics of Household Appliances –II (18UPHV61)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credit</b>     | <b>: 1</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 2</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 30 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To enable the students to understand the basic working of modern electronic appliances.
- To understand concept of memory storage devices.
- To be familiar with the functioning of energy storage peripherals.

**Course Outcomes:**

1. Familiarity with types of cells and basic requirements modern electronic devices.
2. Ability to understand the functioning of modern display devices.
3. Knowledge acquired on working of office devices like laptop, laser printer, 3D printer.
4. Be able to understand basic idea on space communication system.

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**UNIT I** **(6 hrs)**

AC to DC converter – Voltage regulator - Primary cells – Rechargeable cells – Solar cells – Solar panels – Inverter – UPS.

**UNIT II** **(6 hrs)**

Telephone – Cordless Phone – Principle of Cell Phone Communication – Bluetooth - WiFi – Touch screen.

**UNIT III** **(6 hrs)**

Photo Diode and Transistor – Remote Control – Seven Segment Display in Calculator – CRT Display – LCD display – LED Display – Plasma Display.

**UNIT IV** **(6 hrs)**

Laptop- Scanner – Inkjet Printer – Laser Printer – 3d Printer - Charge Coupled Device – Digital Camera.

**UNIT V** **(6 hrs)**

Audio and Video System – Dish Antenna – Satellite Communication – GPS – Remote Sensing.

**Text Book:**

Study materials prepared by Department of Physics of Sri Kaliswari College, Sivakasi.

| <b>Unit</b> | <b>Chapter</b> | <b>Section</b> | <b>Page No.</b> |
|-------------|----------------|----------------|-----------------|
| I           | I              | 1.1 - 1.8.4    | 1 - 7           |
| II          | II             | 2.1 - 2.6.3    | 8 - 16          |
| III         | III            | 3.1 - 3.7.1    | 17 - 29         |
| IV          | IV             | 4.1 - 4.4      | 30 - 37         |
| V           | V              | 5.1 - 5.5      | 38 - 45         |

**Reference Books:**

1. G.Jose robin, A.Ubald raj, "Basic electronics and applied electronics" , Indira publication, First Edition, May 2004.
2. Dr.M.Arumugam, "Semiconductor Physics and Optoelectronics", Anuradha publication, 2005.
3. B.K.Khan , "Non –Conventional Energy Resources" ,Tata Mc Graw hill, 2006.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme –B.Sc**

**Semester VI**

**(2018-2021)**

**Skill Based Course - IV: Energy Physics - II (18UPHS61)**

**(For those who join from June 2018 and afterwards)**

**Credits : 2**

**Int.Marks : 25**

**Hours/Week : 2**

**Ext.Marks : 75**

**Duration : 30 hrs**

**Max. Marks : 100**

**Course Objectives:**

- To gain the knowledge of tidal energy.
- To learn about ocean, thermal energy.
- To understand different types of fuel cells using hydrogen.
- To study the characteristics of fuel cell using hydrogen.
- To be familiar with power conversion and power generation techniques.

**Course Outcomes:**

1. Ability to recognize the need of using of non-conventional energy resources.
2. Apply the acquired knowledge to design new type of ocean energy and wave energy devices.
3. Familiar with future energy technologies.

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**UNIT I**

**(6 hrs)**

Introduction - Tidal Energy – Tidal Energy Origin and Nature – Tidal Energy Technology – Limitations and Environmental Impacts of Ocean Energy - Wave Energy - Power in Waves.

**UNIT II**

**(6 hrs)**

Wave Energy Technology – Present Status – Environmental Impacts – Ocean Thermal Energy – Origin and Characteristics of Resource – Ocean Thermal Energy Conversion Technology –Environmental Impacts.

**UNIT III**

**(6 hrs)**

Fuel Cell – Potential Applications – Classification of Fuel Cells – Phosphoric Fuel Cell – Alkaline Fuel Cell – Solid Polymer Fuel Cell – Molten Carbonate Fuel Cell – Solid Oxide Fuel Cell –Fuel Cell Power Plant – Present Status – Environmental Impacts of Fuel Cells.

**UNIT IV**

**(6 hrs)**

Hydrogen Energy – Properties of Hydrogen – Production of Hydrogen – Storage and Delivery of Hydrogen – Conversion of Hydrogen into Energy – Applications – Safety Issues – Present Status – Bio–Cells.

**UNIT V**

**(6 hrs)**

Magnetohydrodynamic Power Conversion – Basic Principle – MHD Generator – Advantages and Disadvantages - Thermoelectric Power Conversion – Thermoelectric Power Generator – Thermionic Power Conversion.

**Text Book :**

B.H. Khan, “Non – Conventional Energy Resources”, Tata McGraw Hill,  
Seventeenth reprint, 2014.

| <b>Unit</b> | <b>Chapter</b> | <b>Section</b>                      | <b>Page No.</b>           |
|-------------|----------------|-------------------------------------|---------------------------|
| I           | 10             | 10.1 - 10.1.3, 10.1.5, 10.2, 10.2.1 | 311 - 315, 320, 321 - 324 |
| II          | 10             | 10.2.2 -10.3.4                      | 325 - 335                 |
| III         | 12             | 12.1 - 12.1.7,12.1.12 to 12.1.14    | 360 - 370, 377 - 379      |
| IV          | 12             | 12.2 - 12.2.8                       | 379 - 389                 |
| V           | 13             | 13.1 - 13.1.4, 13.2 - 13.3          | 392 - 396, 400 - 407      |

**Reference Books :**

1. G.D. Rai, “Solar Energy Utilization”, Khanna Publishers, Delhi, V Edition, 1995.
2. A.K.Agarwal, “Non – Conventional Energy systems”, A.P.H Publishing Corporation, 2005.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc (Maths /Chemistry)**  
**Semester I/III**  
**(2018-2021)**

**Allied Course - I/III: Physics – I (18UMAA11/18UCHA31)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |             |
|-------------------|-----------------|-------------------|-------------|
| <b>Credits</b>    | <b>: 3</b>      | <b>Int.Marks</b>  | <b>: 25</b> |
| <b>Hours/Week</b> | <b>: 4</b>      | <b>Ext.Marks</b>  | <b>: 75</b> |
| <b>Duration</b>   | <b>: 60 hrs</b> | <b>Max. Marks</b> | <b>:100</b> |

**Course Objectives:**

- To introduce the concept of Moment of inertia.
- To give an exposure on sound.
- To understand the concept of elasticity.
- To make the students to learn about viscosity and surface tension.
- To enable the students to learn about the specific heat of gas and thermodynamics.

**Course Outcomes:**

1. Acquire knowledge in mechanics, wave motions, properties of matter and thermal physics.
2. Ability to understand the applications of different organ pipes.
3. Familiarities with different types moduli of elasticity and calculations of Young's modulus using different methods.
4. Thorough knowledge in viscosity, surface tension and its applications.

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**UNIT I** **(12 hrs)**

**Rotational Motion:** Rotation of Rigid Bodies - Kinetic Energy of Rotating Bodies – Angular Momentum - Torque - Moment of Inertia – Parallel and Perpendicular Axis Theorem – Moment of Inertia of Uniform Rod, Circular Ring, Thin Spherical Shell, Solid Cylinder and Solid Sphere – Ball Rolling Down in an Inclined Plane – Compound Pendulum.

**UNIT II** **(12 hrs)**

**Sound:** Progressive and Stationary Waves – Resonance – Beats - Vibration in a Column of Open and Closed Pipes – Over Tones – Stroboscope – Doppler Effect and its Applications – Intensity and Loudness – Kunt's Tube Experiment - Melde's String Experiment - Transverse Vibration of Stretched String – Expression for the Velocity of Transverse Waves – Laws of Transverse Vibration – Sonometer Laws Verification – Ultrasonics – Production and Uses.

**UNIT III** **(12 hrs)**

**Properties of Solids:** Stress and Strain- Elasticity –Modulus of Elasticity - Energy Stored in Stretched String - Work Done in Twisting a Wire – Bending of Beams – Cantilever- Young's Modulus by Non-Uniform and Uniform Bending – I Section Girders - Torsion in a Wire – Determination of Rigidity Modulus by Torsional Pendulum – Static Torsion - Poisson's Ratio.



**UNIT IV****(12 hrs)**

**Properties of Fluids:** Viscosity – Coefficient of Viscosity – Poiseuille’s Formula - Comparison of Viscosities - Ostwald’s Viscometer – Stoke’s Law – Terminal Velocity – Viscosity of Highly Viscous Liquid – Lubrication - Surface Tension – Molecular Theory of

Surface Tension – Angle of Contact - Surface Tension by Drop Weight Method - Excess Pressure Inside a Drop and Bubble – Interfacial Surface Tension.

**UNIT V****(12 hrs)**

**Thermal Physics:** Specific Heat of Gas – Work Done in Expansion – Mayer’s Relation – Joly’s Experimental Determination of  $C_v$  – Regnault’s Experimental Determination  $C_p$  – Methods of Heat Transfer and its Applications - Kinetic Theory of Gases – Liquefaction of Gases – Joule - Kelvin Effect - Second Law of Thermodynamics – Carnot’s Theorem.

**Text Book :**

“Text book prepared by Department of Physics”, Sri Kaliswari college, Sivakasi.

| Unit | Chapter | Section            | Page No.           |
|------|---------|--------------------|--------------------|
| I    | 1       | 1.1 -1.14          | 1 -19              |
| II   | 2       | 2.1 - 2.14.3       | 23 - 41            |
| III  | 3       | 3.1 -3.15          | 45 -61             |
| IV   | 4       | 4.1 - 4.13         | 63 - 74            |
| V    | 5       | 5.1 - 5.7,5.9,5.12 | 77 - 84,86,90 - 92 |

**Reference Books:**

1. R.Murugesan, “Allied Physics”, S.Chand and co, ltd, 2008.
2. Brijlal Subramanian, “Properties of Matter”, Eurasia Publishing House (Pvt) Ltd, New Delhi, Sixth Edition.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme - B.Sc (Maths /Chemistry)**  
**Semester II/IV**  
**(2018 - 2021)**

**Allied Course – II/IV: Physics - II (18UMAA21/18UCHA41)**  
**(For those who join from June 2018 and afterwards)**

|                   |                |                  |              |
|-------------------|----------------|------------------|--------------|
| <b>Credits</b>    | <b>:3</b>      | <b>Int.Marks</b> | <b>: 25</b>  |
| <b>Hours/week</b> | <b>:4</b>      | <b>Ext.Marks</b> | <b>: 75</b>  |
| <b>Duration</b>   | <b>:60 hrs</b> | <b>Max.Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To impart the knowledge of geometrical optics to the students.
- To give an exposure on physical optics.
- To impart the knowledge of electricity and electronics to the students.
- To impart knowledge on nuclear physics.
- To understand the concept of electronic devices.

**Course Outcomes:**

1. Acquire knowledge in optics, electrostatics, electronics and nuclear physics.
2. Understand the effect of interference, refraction, diffraction and polarization of light.
3. Able to calculate electric field due to the charge arrangements and magnetic field due to current carrying conductors.
4. Apply electronics in a creative and innovative way to design develop and produce useful products.

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**UNIT I** **(12 hrs)**

**Physical Optics:** Velocity of Light - Michelson's Method - Interference - Interference in Thin Films - Air Wedge – Newton's Rings - Theory and Experiment – Diffraction – Fresnel's Explanation of Rectilinear Propagation of Light - Plane Transmission Diffraction Grating - Normal Incidence – Polarisation - Double Refraction - Nicol Prism – Optical Activity – Polarimeter.

**UNIT II** **(12 hrs)**

**Geometrical Optics:** Refraction – Laws of Refraction - Spherical Lenses – Combination of Two Thin Lenses in Contact and Out of Contact - Defects of Images - Distortion - Spherical and Chromatic Aberration in Lenses – Refraction Through Thin Prism – Dispersion Through a Prism - Combination of Two Prisms to Produce Dispersion Without Deviation and Deviation Without Dispersion – Direct Vision Spectrometer.

**UNIT III** **(12 hrs)**

**Electricity and Magnetism:** Capacitance of a Conductor - Energy of a Charged Capacitor - Loss of Energy on Sharing of Charges between Two Capacitors – Potentiometer - Determination of the Internal Resistance of a Cell - Magnetic Effect of Electric current - Biot-Savart's Law - Magnetic Induction at a Point on the Axis of a Circular Coil - Force on a Current Carrying Conductor in a Magnetic Field - Moving Coil Ballistic Galvanometer.

**UNIT IV****(12 hrs)**

**Basic and Digital Electronics:** Junction Diode- Forward and Reverse Bias – Zener Diode – LED - Transistor - Characteristics - Common Emitter Mode – Construction AND, OR, NOT, NAND and NOR Gates of Using Diodes and Transistors – NAND and NOR as Universal Gate -Boolean Algebra - Demorgan's Theorem – Verification of Demorgan's Theorem.

**UNIT V****(12 hrs)**

**Nuclear Physics:** Introduction to Nucleus – Mass Defect – Binding Energy - Radio Activity - Properties of Alpha, Beta and Gamma rays - Law of Radioactive Disintegration - Half Life Period-Mean Life - Nuclear Fission-Energy Released in Fission-Bohr and Wheelers theory of Nuclear Fission - Chain Reaction - Atom Bomb - Nuclear Reactor - Nuclear Fusion – Thermonuclear Reaction - Distinction Between Fission and Fusion.

**Text Book:**

R. Murugesan, “Allied Physics I and II”, S.Chand and Company Ltd, 2005.

| <b>Unit</b> | <b>Chapter</b> | <b>Section</b>  | <b>Page No.</b>  |
|-------------|----------------|---|--|
| I           | 6              | 6.1 - 6.12, 6.14, 6.16, 6.17, 6.20  | 149 - 169, 170 - 175, 176  |
| II          | 5              | 5.1, 5.26, 5.27, 5.16 - 5.19, 5.22, 5.23, 5.10, 5.11, 5.13 - 5.15                     | 114 - 115, 140 - 142, 131 -135, 138 - 139, 124 - 125, 127- 130             |
| III         | 4              | 4.1 - 4.5, 4.7 - 4.9, 4.11, 4.13  | 89 - 93, 95 - 99, 99 - 100, 101 - 103                                      |
| IV          | 10             | 10.1, 10.2, 10.4, 10.5, 10.8 -10.9, 10.12, 10.17 - 10.20, 10.22, 10.24, 10.25 - 10.27 | 256 - 257, 259 - 261, 265 -267, 269 - 271, 276 - 279, 280 - 281, 282 - 288 |
| V           | 8              | 8.3 - 8.9, 8.11 - 8.21, 8.25  | 201 - 208, 208 - 219, 222  |

**Reference Books:**

1. R. Murugesan, “Optics and Spectroscopy”, S.Chand and Company LTD, 1997.
2. B.L.Theraja, “Basic Electronics Solid State”, S.Chand and Company LTD, Ramnagar, New Delhi , 2003.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme – B.Sc (Maths /Chemistry)**  
**Semester II /IV**  
**(2018-2021)**

**Allied Physics Practical (18UMAA2P/18UCHA4P)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                  |             |
|-------------------|-----------------|------------------|-------------|
| <b>Credits</b>    | <b>: 4</b>      | <b>Int.Marks</b> | <b>: 40</b> |
| <b>Hours/Week</b> | <b>: 2+2</b>    | <b>Ext.Marks</b> | <b>: 60</b> |
| <b>Duration</b>   | <b>: 60 hrs</b> | <b>Max.Marks</b> | <b>:100</b> |

**Course Objectives:**

- To determine the Young's modulus of the given material.
- To determine the gravitational constant.
- To determine the viscosities of different liquids.
- To determine voltage and current sensitivity of a table galvanometer.
- To find the refractive index of the material of the solid prism.

**Course Outcomes:**

1. Ability to determine the Young's modulus of different materials.
2. Able to calculate the gravitational constant.
3. Familiar with measuring viscosities of different liquids.
4. Able to calculate the voltage and current sensitivity of a different types galvanometer.
5. Capable of determining the refractive index of solid prism made up of different glasses.
6. Ability to construct the logic gates by using discrete components.

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**Any Fourteen**

1. Young's Modulus - Non uniform bending – Optic lever.
2. Young's Modulus -Uniform bending – Pin and Microscope .
3. Compound pendulum – Determination of 'g'.
4. Torsion pendulum – Determination of I.
5. LCR – Series resonance circuit.
6. Spectrometer -  $\mu$  of the prism –minimum deviation.
7. Sonometer- Verification of laws.
8. Comparison of the co-efficient of viscosities by Ostwald's Viscometer.
9. Table Galvanometer - Voltage and Current sensitivities.
10. Air wedge - Thickness of a wire.
11. Newton's rings -Determination of Radius of curvature of a lens.
12. Sonometer – Determination of AC frequency.
13. Transistor Characteristics-CE mode.
14. Zener diode – Forward and reverse biased Characteristics.
15. Logic Gates (NAND, NOR) - Discrete Components.
16. Logic Gates (AND, OR, NOT) -Discrete Components.

**Reference Book:**

M.N.Srinivasan, S.Balasubramanian, R.Ranganathan, “A Textbook of Practical Physics”, Sultan Chand & Sons educational Publishers, NewDelhi, First edition 1990, Reprint: 2011.

**Sri Kaliswari College (Autonomous), Sivakasi**  
**Department of Physics**  
**UG Programme**  
**Semester III**  
**(2018-2021)**

**Extra Credit Course : Electricity and Electrical Appliances (18UPHEX1)**  
**(For those who join from June 2018 and afterwards)**

|                   |                 |                   |              |
|-------------------|-----------------|-------------------|--------------|
| <b>Credits</b>    | <b>: 2</b>      | <b>Int.Marks</b>  | <b>: 25</b>  |
| <b>Hours/Week</b> | <b>: 4</b>      | <b>Ext.Marks</b>  | <b>: 75</b>  |
| <b>Duration</b>   | <b>: 60 hrs</b> | <b>Max. Marks</b> | <b>: 100</b> |

**Course Objectives:**

- To understand the basic concepts of electricity.
- To give an exposure on electric devices to produce light and heat.
- To acquire the knowledge of electrical wiring and safety measurements.
- To gather the basic knowledge in a.c and d.c equipments.
- To receive the Hand on training in electrical equipments.

**Course Outcomes:**

1. Understand the basic concept of Direct current and Alternative current.
2. Learn various domestic electrical appliances.
3. Enable to rectify simple errors/troubles occurring in home appliances.
4. Gain knowledge in different types of motors and transformer.
5. Develop skill in constructing simple circuits.

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**UNIT I** **(12 hrs)**

**Fundamental concepts and Direct Current:** AC and DC supply – Ohm’s Law - Conductors and Insulators – Arrangement of Resistances in Series and Parallel – Three Types of Circuit – Effects of Electric Current – Work , Power, Energy and Related Problems – Primary and Secondary Cells , Leclanche Cell, Dry Cell , Daniel Cell, Lead Acid Cell – Grouping of Cells and Related Problems – DC Generator and Types – DC Motor (Qualitative).

**UNIT II** **(12 hrs)**

**Types of Electrical Lamp and Heating Devices:** Filament Lamp – Fluorescent Lamp – LED Lamp – Room Heater – Water Heater – Electric Iron – Electric Range – Hot Plate.

**UNIT III** **(12hrs)**

**Electrical Accessories and Safety Measurements:** Switches – Lamp Holders – Wires and Cables – Various Types of Wires and Current Ratings – Casing and Capping Wiring – Conduit Pipe Wiring – T.R.S or C.T.S or P.V.C Wiring – I.S.I Rules for Wiring (General) – I.S.I Rules for Wiring – I.S.I Rules for Lighting – I.S.I Rules for Socket Outlets and Fans - Earthing and Reason for Earthing – Method of Pipe Earthing – Fuses – Types of Fuse – Current Rating of Fuse – Precaution Against Shock – Artificial Respiration – Safety Precaution in Electricity – Safety Precaution to be Followed in Handling the Tools.

**UNIT IV****(12 hrs)**

**A.C. machine:** A.C Generator – Poly Phase - Star , Delta Connection – Three Phase for Four wire System – Transformer – Parts of Transformer – Types of Transformer – Transformer in Distribution System – Alternator Working Principle – Parts of Alternator – Relation between Speed and Frequency of an Alternator – Induction Motor Construction and Working – Construction of Permanent Capacitor Motor – Application of Permanent Capacitor Motor in Table Fan and Ceiling Fan – Working Method - Defects in Fans – Application of Universal Motor in Sewing Machine – Working Method and Possible Defects in Hair Dryer, Mixer.

**UNIT V****(12 hrs)****(Not for theory examination) Hands on training**

1. Transformer, Eliminator
2. Line Tester, Use of Multimeter
3. Electric Bell
4. Soldering Iron, Iron Box, Immersion Heater
5. Fan and Speed regulator
6. Filament Lamp, Tube Light, Mercury Vapor Lamp
7. To test Choke and Starter
8. To control one Lamp using single switch
9. To control two Lamp using single switch
10. Stair case switch
11. Connection of voltmeter and ammeter and to measure voltage and current
12. To Connect 3 lamps in series and verify the properties of series circuit
13. To Connect 3 lamps in parallel and verify the properties of parallel circuit
14. To familiarize with electrical equipments

**Text Book:**

Electricity and Electrical appliances manual.

| <b>Unit</b> | <b>Chapter</b> | <b>Page No.</b> |
|-------------|----------------|-----------------|
| I           | I              | 1 - 27          |
|             | X              | 122-160         |
| II          | VII            | 71 - 121        |
| III         | III            | 29 - 61         |
| IV          | XII            | 161 - 209       |

**Reference Book:**

Dr.N. Prem kumar, “Basic electrical electronics and computer engineering”, Anuradha agencies, Vidyal Karuppur Kumbakonam, 1995.

**Sri Kaliswari College (Autonomous), Sivakasi**

**Department of Physics**

**UG Programme**

**Semester IV**

**(2018-2021)**

**Extra Credit Course: Applied Physics (18UPHEX2)**

**(For those who join from June 2018 and afterwards)**

**Credits : 2**

**Hours/Week : 4**

**Duration : 60 hrs**

**Int.Marks : 25**

**Ext. Marks : 75**

**Max. Marks : 100**

**Course Objectives:**

- To understand the principle of Laser and its applications.
- Familiarize the applications of laser.
- To gain knowledge of fundamental energy resources.
- To acquire knowledge about Nano science and nanotechnology.
- To learn modern applications of nanotechnology.

**Course Outcomes:**

1. Understand applications of laser.
  2. Familiarize with the fiber optic communication system.
  3. Evaluate the renewable energy resources.
  4. Decipher the fundamental concepts of nanotechnology.
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**UNIT I**

**(12 hrs)**

**Principles of Laser Action:** Absorption and Emission of Light – Spontaneous Emission – Stimulated Emission – Einstein Relations (No Derivation) - Population Inversion – Pumping – Two Levels, Three and Four Level Pumping Scheme - Pumping Methods – Optical Pumping – Electrical Pumping.

**UNIT II**

**(12 hrs)**

**Applications of Laser:** Laser Applications in Medicine and Surgery – Laser Diagnostic – Laser in Ophthalmology – Photocoagulation – Treatment of Glaucoma – Refractive Eye Surgery – Laser Dermatology - Lasers in Material Processing – Laser Cutting, Drilling , and Welding – Laser Free Space Communication - LIDAR.

**UNIT III**

**(12 hrs)**

**Energy Resources :** Classification of Energy Resources – Consumption Trends of Primary Energy Resources – Importance of Non –Conventional Energy Resources – Energy Chain - Common Forms of Energy – Advantage and Disadvantage of Conventional Energy Resources –Salient Features of Non – Conventional Energy Resources –Environmental Aspect of Energy.

**UNIT IV**

**(12 hrs)**

**Nanotechnology:** Introduction – Scientific Revolutions – Basic Science Behind Nanotechnology – Nanometer – Material at Nano Scale – Rationale Behind the Downsizing of



the Materials - Particle Size Versus Surface Area - Surface Chemistry of Materials - Size and Shape Matter.

## UNIT V

(12 hrs)

**Applications of Nanotechnology :** Energy Applications – Electronic Application (Nano Electronics) – Nano Circuits – Carbon Nanotubes Interconnects – Carbon Nanotubes Field Effect Transistor – Nano Scale Silicon Photonic Crystals – Computing Applications (Nano Computers) - Quantum Computing – Molecular Computing – Chemical Applications (Nano Chemistry)- Optical Applications (Nano Photonics).

### Text Books:

- 1.S. Richa Sharma and Vibhu Sharma,“Laser Systems and applications”, ALTBS Publishers, India, 2010 Edition.
2. B.H. Khan, “Non – Conventional Energy Resources”, McGraw Hill Education (India) private limited Seventeenth reprint 2014.
- 3.Dr.M.A.Shah and Dr.M.A.Shah,“Nanotechnology The science of small”, Wiley India Pvt Ltd, New Delhi (2013).

| Unit | Text Book No. | Chapter | Section                           | Page No.                                   |
|------|---------------|---------|-----------------------------------|--|
| I    | 1             | 3       | 3 - 3.7 (a), (b)                  | 57 - 73                                    |
| II   | 1             | 6       | 6.1 - 6.1.6 , 6.2 , 6.3.1 , 6.4.4 | 177 - 184 , 186 - 194, 197- 199, 201 - 204 |
| III  | 2             | 1       | 1.3-1.10                          | 2 - 13                                     |
| IV   | 3             | 1       | 1.1 - 1.4 , 1.6 , 1.8 - 1.9       | 2 - 11 , 14 - 18                           |
| V    | 3             | 6       | 6.5 - 6.9                         | 126 - 132                                  |

### Reference Books:

1. Charles P. Poole Jr. and Frank J. Owens,“Introduction to Nanotechnology”, Wiley Interscience , John Wiley and Sons Publication 2009.
2. S.Shanmugam, “Nanotechnology”, MJP Publishers, Chennai, 2010.
3. G.D. Rai, “Solar Energy Utilization”, Khanna Publishers, Delhi, V Edition 1995.
4. A.K.Agarwal,“Non – Conventional Energy systems”, A.P.H Publishing Corporation, 2005.