

## (Common course structure – B.Sc– 2023 - 2024)

Department : Physics

Programme Code: USPH

## SEMESTER – I

| Part | Course Type | Title of the Course                | Hrs/<br>Week | Credits   | Marks |     |            |
|------|-------------|------------------------------------|--------------|-----------|-------|-----|------------|
|      |             |                                    |              |           | CIA   | ESE | Total      |
| I    | LC – I      | Tamil                              | 6            | 3         | 25    | 75  | 100        |
| II   | ELC - I     | English                            | 6            | 3         | 25    | 75  | 100        |
| III  | CC – I      | Properties of Matter and Sound     | 5            | 5         | 25    | 75  | 100        |
| III  | CC – II     | Properties of Matter - Practical I | 3            | 2         | 40    | 60  | 100        |
| III  | GEC – I     | Calculus and Fourier series        | 6            | 5         | 25    | 75  | 100        |
| IV   | SEC         | Value education                    | 2            | 2         | 25    | 75  | 100        |
| IV   | FC          | Introductory Physics               | 2            | 2         | 25    | 75  | 100        |
|      |             | <b>Total</b>                       | <b>30</b>    | <b>22</b> |       |     | <b>700</b> |

## SEMESTER – II

| Part | Course Type | Title of the Course                          | Hrs/<br>Week | Credits   | Marks |     |            |
|------|-------------|----------------------------------------------|--------------|-----------|-------|-----|------------|
|      |             |                                              |              |           | CIA   | ESE | Total      |
| I    | LC – II     | Tamil                                        | 6            | 3         | 25    | 75  | 100        |
| II   | ELC – II    | English                                      | 6            | 3         | 25    | 75  | 100        |
| III  | CC – III    | Heat, Thermodynamics and Statistical Physics | 5            | 5         | 25    | 75  | 100        |
| III  | CC - IV     | Thermal Physics & Sound - Practical II       | 3            | 2         | 40    | 60  | 100        |
| III  | GEC - II    | Laplace Transform and vector calculus        | 6            | 5         | 25    | 75  | 100        |
| V    | SEC         | Physics for Everyday Life                    | 2            | 2         | 25    | 75  | 100        |
| V    | EVS         | Environmental Studies                        | 2            | 2         | 25    | 75  | 100        |
|      |             | <b>Total</b>                                 | <b>30</b>    | <b>22</b> |       |     | <b>800</b> |




### SEMESTER – III

| Part | Course Type | Title of the Course                                             | Hrs/Week  | Credits   | Exam<br>Hours | Marks |     |            |
|------|-------------|-----------------------------------------------------------------|-----------|-----------|---------------|-------|-----|------------|
|      |             |                                                                 |           |           |               | CIA   | ESE | Total      |
| I    | LC – III    | Tamil                                                           | 6         | 3         | 3             | 25    | 75  | 100        |
| II   | ELC - III   | English                                                         | 6         | 3         | 3             | 25    | 75  | 100        |
| III  | CC – V      | Mechanics                                                       | 6         | 6         | 3             | 25    | 75  | 100        |
|      | CC – VI     | Electricity Magnetism and Optics<br>Practical I                 | 3         | 2         | 3             | 40    | 60  | 100        |
|      | GEC – III   | Chemistry for Physical Sciences - I                             | 4         | 4         | 3             | 25    | 75  | 100        |
|      | GEC – IV    | Chemistry Practical for Physical and<br>Biological Sciences - I | 2         | 2         | 3             | 25    | 75  | 100        |
|      |             |                                                                 |           |           |               |       |     |            |
| IV   | SEC         | Home Electrical Installation                                    | 1         | 1         | 3             | 25    | 75  | 100        |
| IV   | SEC         | Energy Physics                                                  | 2         | 2         | 3             | 25    | 75  | 100        |
|      |             | <b>Total</b>                                                    | <b>30</b> | <b>22</b> |               |       |     | <b>800</b> |

IV

HW

(extra credit)

Health and well new

### SEMESTER – IV

01  
23

| Part | Course Type | Title of the Course                                              | Hrs/<br>Week | Credits   | Exam<br>Hours | Marks |     |            |
|------|-------------|------------------------------------------------------------------|--------------|-----------|---------------|-------|-----|------------|
|      |             |                                                                  |              |           |               | CIA   | ESE | Total      |
| I    | LC – IV     | Tamil                                                            | 6            | 3         | 3             | 25    | 75  | 100        |
| II   | ELC - IV    | English                                                          | 6            | 3         | 3             | 25    | 75  | 100        |
| III  | CC – VII    | Optics and Laser Physics                                         | 5            | 5         | 3             | 25    | 75  | 100        |
|      | CC – VIII   | Electricity Magnetism and Optics -<br>Practical II               | 3            | 2         | 3             | 25    | 75  | 100        |
|      | GEC – V     | Chemistry for Physical Sciences - II                             | 4            | 4         | 3             | 40    | 60  | 100        |
|      | GEC – VI    | Chemistry Practical for Physical and<br>Biological Sciences - II | 2            | 2         | 3             | 25    | 75  | 100        |
|      |             |                                                                  |              |           |               |       |     |            |
| IV   | SEC         | Medical Physics                                                  | 2            | 2         | 3             | 25    | 75  | 100        |
|      | DSEC        | Astrophysics                                                     | 2            | 2         | 3             | 25    | 75  | 100        |
|      |             | <b>Total</b>                                                     | <b>30</b>    | <b>22</b> |               |       |     | <b>800</b> |

Extension activity

28/11

## SEMESTER – V

| Part | Course Type | Title of the Course                                                                                            | Hrs/<br>Week | Credits | Exam<br>Hrs | Marks |     |       |
|------|-------------|----------------------------------------------------------------------------------------------------------------|--------------|---------|-------------|-------|-----|-------|
|      |             |                                                                                                                |              |         |             | CIA   | ESE | Total |
| III  | CC - IX     | Electricity, Magnetism and Electromagnetism                                                                    | 6            | 5       | 3           | 25    | 75  | 100   |
|      | CC - X      | Atomic and Nuclear Physics                                                                                     | 5            | 5       | 3           | 25    | 75  | 100   |
|      | CC - XI     | General and C-programming – Practical V                                                                        | 6            | 3       | 3           | 40    | 60  | 100   |
|      | CC - XXI    | Project and Viva voce                                                                                          | 3            | 3       | 3           | 20    | 80  | 100   |
|      | DSE - I     | (i) Computer Programming-“C” Language<br>(ii) Nano Science and Nanotechnology<br>(iii) Medical Instrumentation | 4            | 4       | 3           | 25    | 75  | 100   |
|      | DSE - II    | (i) Analog Electronics<br>(ii) Laser and Fiber Optics<br>(iii) Digital Photography                             | 4            | 4       | 3           | 25    | 75  | 100   |
| IV   | SEC         | Non-Destructive Testing                                                                                        | 2            | 2       | 3           | 25    | 75  | 100   |
|      | AEC - 1     | Internship/Industrial training                                                                                 | -            | 2       | -           | -     | -   |       |
|      |             | Total                                                                                                          | 30           | 28      |             |       |     | 700   |

## SEMESTER – VI

| Part | Course Type | Title of the Course                                                                                       | Hrs/<br>Week | Credits | Exam<br>Hrs | Marks |     |       |
|------|-------------|-----------------------------------------------------------------------------------------------------------|--------------|---------|-------------|-------|-----|-------|
|      |             |                                                                                                           |              |         |             | CIA   | ESE | Total |
| III  | CC – XIII   | Quantum Mechanics and Relativity                                                                          | 5            | 5       | 3           | 25    | 75  | 100   |
|      | CC – XIV    | Solid State Physics                                                                                       | 5            | 5       | 3           | 25    | 75  | 100   |
|      | CC – XVI    | Electronics and Microprocessor 8085-<br>Practical VI                                                      | 6            | 3       | 3           | 40    | 60  | 100   |
|      | DSE – III   | (i) Digital Electronics and Microprocessor-<br>8085<br>(ii) Communication Physics<br>(iii) Energy Physics | 5            | 4       | 3           | 25    | 75  | 100   |
|      | DSE – IV    | (i) Materials Science<br>(ii) Mathematical Physics<br>(iii) Advanced Mathematical Physics                 | 4            | 3       | 3           | 25    | 75  | 100   |
| IV   | SEC         | Entertainment Electronics                                                                                 | 2            | 2       | 3           | 25    | 75  | 100   |
|      | AEC – II    | Professional Competency Skill – Physics<br>for competitive examinations                                   | 2            | 2       | 3           | 25    | 75  | 100   |
| V    | GS          | Gender Studies                                                                                            | 1            | 1       | 3           | 25    | 75  | 100   |
|      |             | Total                                                                                                     | 30           | 25 ✓    |             |       |     | 800   |

$$\begin{array}{r}
 1 - 15 = 91 \\
 25 \\
 \hline
 144 + 2 \text{ extra} = 146
 \end{array}$$

*for*

### COURSE OUTCOMES:

At the end of the course, the student will be able to:

|                                                                                               |                                                                                                                                                                       |              |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>CO1</b>                                                                                    | Understanding Hooke's law, defining surface tension, knowing the formula for Poiseuille's flow.                                                                       | <b>K1</b>    |
| <b>CO2</b>                                                                                    | Explaining the stress-strain diagram, understanding the relationship between surface tension and molecular forces.                                                    | <b>K2</b>    |
| <b>CO3</b>                                                                                    | Applying Poisson's ratio to calculate deformations, solving problems related to bending of beams using Young's modulus.                                               | <b>K3</b>    |
| <b>CO4</b>                                                                                    | Analyzing experimental results to determine fluid viscosity, evaluating resonance phenomena in oscillating systems.                                                   | <b>K4</b>    |
| <b>CO5</b>                                                                                    | Designing an experiment to determine Young's modulus using a microscope, Reflecting on the limitations of experimental methods used to determine physical properties, | <b>K5,K6</b> |
| <b>K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate ; K6 – Create;</b> |                                                                                                                                                                       |              |

### MAPPING WITH PROGRAM OUTCOMES:

Map Course Outcomes (CO) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) on a 4-point scale of VERY STRONG (4), STRONG (3) MEDIUM (2) and LOW (1).

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|
| <b>CO1</b> | 4   | 3   | 2   | 2   | 1   | 1   | 2   | 3    | 3    | 3    | 2    | 1    | 1    | 2    |
| <b>CO2</b> | 4   | 3   | 3   | 3   | 2   | 1   | 2   | 4    | 4    | 4    | 3    | 2    | 1    | 2    |
| <b>CO3</b> | 4   | 3   | 4   | 2   | 1   | 1   | 2   | 4    | 3    | 4    | 2    | 1    | 1    | 2    |
| <b>CO4</b> | 3   | 3   | 4   | 4   | 1   | 2   | 2   | 3    | 3    | 4    | 4    | 1    | 2    | 2    |
| <b>CO5</b> | 4   | 4   | 3   | 3   | 2   | 2   | 2   | 4    | 4    | 3    | 3    | 2    | 2    | 2    |



**PHYSICS CORE PRACTICAL I**

| Course Code | Title of the Course                 | Category | Credits | Inst. Hours | Total Marks |
|-------------|-------------------------------------|----------|---------|-------------|-------------|
|             | <b>PHYSICS CORE PRACTICAL<br/>I</b> | CC II    | 2       | 3           | 60          |

Apply various physics concepts to understand Properties of Matter, set up experimentation to verify theories, quantify and analyze, able to do error analysis and correlate results

**(Any Eight Experiments)**

1. Determination of rigidity modulus without mass using Torsional pendulum.
2. Determination of rigidity modulus with masses using Torsional pendulum.
3. Determination of moment of inertia of an irregular body.
4. Verification of parallel axes theorem on moment of inertia.
5. Verification of perpendicular axes theorem on moment of inertia.
6. Determination of moment of inertia and  $g$  using Bifilar pendulum.
7. Determination of Young's modulus by stretching of wire with known masses.
8. Verification of Hook's law by stretching of wire method.
9. Determination of Young's modulus by uniform bending – load depression graph. – Pin and Microscope
10. Determination of Young's modulus by non-uniform bending – load depression graph. – Pin and Microscope
11. Determination of Young's modulus by cantilever – load depression graph.
12. Determination of Young's modulus by cantilever – oscillation method
13. Determination of Young's modulus by Koenig's method – ( or unknown load)
14. Determination of rigidity modulus by static torsion.
15. Determination of  $Y$ ,  $n$  and  $K$  by Searle's double bar method.
16. Determination of surface tension by drop weight method.
17. Determination of surface tension by Capillary rise method.
18. Determination of interfacial surface tension between two liquids by drop weight method.
19. Determination of co-efficient of viscosity by Stokes' method – terminal velocity.
20. Determination of critical pressure for streamline flow.
21. Determination of Poisson's ratio of rubber tube.
22. Determination of viscosity by Poiseuille's flow method.
23. Determination radius of capillary tube by mercury pellet method.
24. Determination of  $g$  using compound pendulum.

**METHOD OF EVALUATION**

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 40                             | 60                       | 100   |       |

## COURSE OUTCOMES:

At the end of the course, the student will be able to:

|            |                                                                                                                                                                                                                                                                                                                                                                                                                |              |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>CO1</b> | Describe the basic concepts of rigidity modulus, Young's modulus, surface tension, and viscosity, as well as the significance of these properties in physical systems.                                                                                                                                                                                                                                         | <b>K1</b>    |
| <b>CO2</b> | Articulate the processes involved in experiments such as the Torsional Pendulum, Bifilar Pendulum, and various methods for measuring Young's modulus, surface tension, and viscosity.                                                                                                                                                                                                                          | <b>K2</b>    |
| <b>CO3</b> | Perform experiments to determine rigidity modulus, Young's modulus, and viscosity using various methods, demonstrating their ability to apply theoretical knowledge to practical scenarios.                                                                                                                                                                                                                    | <b>K3</b>    |
| <b>CO4</b> | Analyze results from experiments (such as load-deformation graphs and oscillation methods), assess the validity of their findings, and compare results with theoretical expectations.                                                                                                                                                                                                                          | <b>K4</b>    |
| <b>CO5</b> | Develop experimental setups to investigate the moment of inertia and other properties, integrating knowledge from different areas of physics to create innovative solutions to measurement challenges. Assess the effectiveness and limitations of various experimental methods for measuring physical properties, making informed judgments about which methods are most appropriate for different scenarios. | <b>K5,K6</b> |

**K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate ; K6 – Create;**

## MAPPING WITH PROGRAM OUTCOMES:

Map Course Outcomes (CO) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) on a 4-point scale of VERY STRONG (4), STRONG (3) MEDIUM (2) and LOW (1).

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|
| <b>CO1</b> | 4   | 2   | 2   | 2   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 1    | 2    |
| <b>CO2</b> | 4   | 3   | 3   | 2   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 2    | 2    |
| <b>CO3</b> | 4   | 2   | 3   | 2   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 2    | 2    |
| <b>CO4</b> | 3   | 2   | 4   | 3   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 1    | 1    |
| <b>CO5</b> | 4   | 2   | 3   | 3   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 2    | 2    |

## VALUE EDUCATION

| Course Code | Title of the Course | Category | Credits | Inst. Hours | Total Marks |
|-------------|---------------------|----------|---------|-------------|-------------|
|             | VALUE EDUCATION     | VE       | 2       | 2           |             |

### UNIT-I முன்னுரை-விழுமிய கல்வி

1. வாழ்வியல் விழுமியங்கள்
2. விழுமியங்களின் வகைகள்
3. வாழ்வியல் விழுமியங்களை பாதிக்கும் காரணிகள்.
4. விழுமியக் கல்வியின் அவசியம்

### UNIT-II நன்னடத்தைகள்

1. பெற்றோரை மதித்தல்
2. ஆசிரியரை மதித்தல்
3. இறைவழிபாடு
4. சுயமதிப்பு

### UNIT-III சமூகம் சார்ந்த மதிப்புகள்

1. ஒற்றுமை
2. சமத்துவம். சகோதரத்துவம்
3. குடும்பம்
4. குடிமக்களின் கடமைகள். தேசபக்தி

### UNIT-IV உடல்நலம் மனநலம்

1. உணவு ஒழுக்கம்
2. தனி மனித சுகாதாரம்
3. மகளிர் ஆரோக்யம்
4. எண்ணங்களின் வலிமை

### UNIT-V சீர்கேடுகளும் சீர்திருத்தங்களும் சீர்கேடுகளும்

1. வாழ்க்கை விழுமியங்கள் மற்றும் அறங்களில் உலகமயமாதலின் பாதிப்பு
2. ஊடகங்களின் பாதிப்பு. சீர்திருத்தங்கள்
3. மனக்கட்டுப்பாடு விருப்பங்களை நெறிப்படுத்துதல்
4. உடற்பயிற்சி தியானம் யோகா

| FOUNDATION COURSE -<br>INTRODUCTORY PHYSICS                                                                                                                 |                         |          | I YEAR - FIRST<br>SEMESTER |                |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------|----------------------------|----------------|-------|
| Subject<br>Code                                                                                                                                             | Subject Name            | Category | Credits                    | Inst.<br>Hours | Marks |
| UPIFC                                                                                                                                                       | INTRODUCTORY<br>PHYSICS | FC       | 2                          | 2              | 75    |
| To help students get an overview of Physics before learning their core courses. To serve as a bridge between the school curriculum and the degree programme |                         |          |                            |                |       |

#### UNIT-I

Vectors, scalars –examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions– standard physics constants

#### UNIT-II

Different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear –mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces.

#### UNIT-III

Different forms of energy– conservation laws of momentum, energy – types of collisions –angular momentum– alternate energy sources–real life examples

#### UNIT-IV

Types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads – stream line and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations.

#### UNIT-V

Surface tension – shape of liquid drop – angle of contact – viscosity –lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use- conductors, insulators – thermal and electric.

#### BOOKS FOR STUDY:

1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand & Co
2. BrijLal & N. Subrahmanyam, 2003, Properties of Matter, S.Chand & Co.

#### REFERENCE BOOKS

1. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, S.Chand & Co.

#### WEBLINKS

1. <http://hyperphysics.phyastr.gsu.edu/hbase/permot2.html><https://science.nasa.gov/ems/>
2. [https://eesc.columbia.edu/courses/ees/climate/lectures/radiation\\_hays/](https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/)

#### QUESTION PATTERN:

| SECTION - A                                                       |
|-------------------------------------------------------------------|
| 1 question from each unit (Either or type questions)<br>(5X15=75) |

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## COURSE OUTCOMES:

At the end of the course, the student will be able to:

|                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                     |              |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>CO1</b>                                                                                    | Define and provide examples of scalars and vectors, and explain the fundamental principles of units, dimensions, and standard physics constants.                                                                                                                                                                                                                                    | <b>K1</b>    |
| <b>CO2</b>                                                                                    | Articulate the different types of forces (gravitational, electrostatic, etc.) and describe their characteristics, as well as the mechanical forces encountered in everyday scenarios.                                                                                                                                                                                               | <b>K2</b>    |
| <b>CO3</b>                                                                                    | Apply the conservation laws of momentum and energy to various physical situations, analyze different types of collisions, and discuss alternative energy sources with real-life examples.                                                                                                                                                                                           | <b>K3</b>    |
| <b>CO4</b>                                                                                    | Analyze different forms of motion, including linear, projectile, and circular, and evaluate their implications in real-world contexts, such as banking of roads and wave motion.                                                                                                                                                                                                    | <b>K4</b>    |
| <b>CO5</b>                                                                                    | Develop an understanding of properties like surface tension and viscosity, and integrate this knowledge to discuss real-life applications in daily materials and their classifications (conductors, insulators).critically assess how physical principles influence technology, the environment, and daily life, discussing implications of energy sources and material properties. | <b>K5,K6</b> |
| <b>K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate ; K6 – Create;</b> |                                                                                                                                                                                                                                                                                                                                                                                     |              |

## MAPPING WITH PROGRAM OUTCOMES:

Map Course Outcomes (CO) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) on a 4-point scale of VERY STRONG (4), STRONG (3) MEDIUM (2) and LOW (1).

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|
| <b>CO1</b> | 4   | 2   | 2   | 2   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 1    | 2    |
| <b>CO2</b> | 4   | 3   | 3   | 2   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 2    | 2    |
| <b>CO3</b> | 4   | 2   | 3   | 2   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 2    | 2    |
| <b>CO4</b> | 3   | 2   | 4   | 3   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 1    | 1    |
| <b>CO5</b> | 4   | 2   | 3   | 3   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 2    | 2    |

UG - II<sup>nd</sup> sem

UPC 203

| Subject Code                                                                                                                                                                                                                                                                                                                                    | Subject Name                                        | Category | Credits | Inst. Hours | Marks |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|----------|---------|-------------|-------|
|                                                                                                                                                                                                                                                                                                                                                 | <b>HEAT, THERMODYNAMICS AND STATISTICAL PHYSICS</b> | CC II    | 5       | 5           | 75    |
| <p>The course focuses to understand a basic in conversion of temperature in Celsius, Kelvin and Fahrenheit scales. Practical exhibition and explanation of transmission of heat in good and bad conductor. Relate the laws of thermodynamics, entropy in everyday life and explore the knowledge of statistical mechanics and its Relation.</p> |                                                     |          |         |             |       |

## UNIT I: CALORIMETRY

Specific heat capacity – specific heat capacity of gases CP & CV – Meyer's relation. low temperature physics: Joule-Kelvin effect – porous plug experiment – Joule-Thomson effect – Boyle temperature – Temperature of inversion – liquefaction of gas by Linde's Process – adiabatic demagnetization. Practical application of Low temperature-Refrigerating mechanism, Air conditioning machine.

## UNIT II: THERMODYNAMICS-I

Zeroth law and first law of thermodynamics – P-V diagram – heat engine – efficiency of heat engine – Carnot's engine, construction, working and efficiency of petrol engine and diesel engines – comparison of engines

### UNIT III: THERMODYNAMICS-II

Second law of thermodynamics – entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram –thermo dynamical scale of temperature – Maxwell's thermo dynamical relations –Clasius- Clapeyron's equation (first latent heat equation) – third law of thermodynamics – un attainability of absolute zero – heat death.

## UNIT IV: HEAT TRANSFER

Modes of heat transfer: Conduction, Convection and Radiation. *Conduction:* Thermal conductivity – determination of thermal conductivity of a good conductor by Forbe's method – determination of thermal conductivity of a bad conductor by Lee's disc method.

**Radiation:** Black body radiation (Ferry's method) – distribution of energy in

## UNIT V: STATISTICAL MECHANICS

Definition of phase-space – micro and macro states – ensembles – different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function – Bose-Einstein statistics – expression for distribution function – Fermi-Dirac statistics – expression for distribution function – comparison of three statistics.

**BOOKS FOR STUDY:**

1. Brijlal & N. Subramaniam, 2000, Heat and Thermodynamics, S.Chand & Co.
2. Narayanamoorthy & Krishna Rao, 1969, Heat, Triveni Publishers, Chennai.
3. V.R.Khanna & R.S.Bedi, 1998 1<sup>st</sup> Edition, Text book of Sound, Kedar Nath Publish & Co, Meerut
4. Brijlal and N.Subramanyam, 2001, Waves and Oscillations, Vikas Publishing House, New Delhi.
5. Ghosh, 1996, Text Book of Sound, S.Chand & Co. R.Murugesan & Kiruthiga Sivaprasath, Thermal Physics, S.Chand & Co.

**BOOKS FOR REFERENCE:**

1. J.B.Rajam & C.L.Arora, 1976, Heat and Thermodynamics, 8<sup>th</sup>edition, S.Chand & Co. Ltd.
2. D.S.Mathur, Heat and Thermodynamics, Sultan Chand & Sons.
3. Gupta, Kumar, Sharma, 2013, Statistical Mechanics, 26<sup>th</sup> Edition, S.Chand & Co.
4. Resnick, Halliday & Walker, 2010, Fundamentals of Physics, 6<sup>th</sup> Edition. Sears, Zemansky, Hugh D. Young, Roger A. Freedman, 2021 University. Physics with Modern Physics 15<sup>th</sup> Edition, Pearson.

## WEB SOURCES

1. [https://youtu.be/M\\_5KYncYNyc](https://youtu.be/M_5KYncYNyc)
2. <https://www.youtube.com/watch?v=4M72kOulGKk&vI=en>

**QUESTION PATTERN:**

| Section A                                         |                                    | Section B                                  | Section C                           |
|---------------------------------------------------|------------------------------------|--------------------------------------------|-------------------------------------|
| Multiple choice question from each unit (10X1=10) | 1 question from each unit (5X2=10) | 1 (a & b) question from each unit (5X5=25) | 1 question from each unit (3X10=30) |

## **COURSE OUTCOMES:**

At the end of the course, the student will be able to:

|                                                                                               |                                                                                                                                                                |              |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>CO1</b>                                                                                    | Apply principles of specific heat capacity and explain measurements of high temperature as well as low temperature students to understand the behavior of gas. | <b>K1</b>    |
| <b>CO2</b>                                                                                    | Analyze thermodynamic process using pr-diagrams and Explain the implications of the laws of Thermodynamics in diesel and petrol engines.                       | <b>K2</b>    |
| <b>CO3</b>                                                                                    | Solve the performance of thermodynamics systems viz efficiency by problems. Understand the thermodynamics properties like enthalpy, entropy.                   | <b>K3</b>    |
| <b>CO4</b>                                                                                    | Determine the mode of heat transfer and apply it to good and bad conductors. study the different parameters related to heat, and their important applications. | <b>K4</b>    |
| <b>CO5</b>                                                                                    | Apply statistical mechanics concepts to describe physical systems.                                                                                             | <b>K5,K6</b> |
| <b>K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate ; K6 – Create;</b> |                                                                                                                                                                |              |

## **MAPPING WITH PROGRAM OUTCOMES:**

Map Course Outcomes (CO) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) on a 4-point scale of VERY STRONG (4), STRONG (3) MEDIUM (2) and LOW (1).

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|
| <b>CO1</b> | 3   | 2   | 1   | 2   | 4   | 2   | 4   | 2    | 2    | 1    | 1    | 3    | 2    | 4    |
| <b>CO2</b> | 2   | 2   | 4   | 2   | 1   | 3   | 4   | 1    | 4    | 3    | 2    | 4    | 3    | 4    |
| <b>CO3</b> | 3   | 2   | 2   | 2   | 2   | 1   | 4   | 1    | 4    | 1    | 1    | 3    | 4    | 4    |
| <b>CO4</b> | 4   | 2   | 3   | 3   | 2   | 1   | 4   | 3    | 3    | 2    | 1    | 4    | 4    | 3    |
| <b>CO5</b> | 4   | 3   | 2   | 1   | 2   | 3   | 4   | 3    | 3    | 1    | 2    | 3    | 4    | 3    |

| CC IV - PHYSICS CORE PRACTICAL II                                                                                                                                                                                                   |                           |          | I YEAR – SECOND SEMESTER |             |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------|--------------------------|-------------|-------|
| Subject Code                                                                                                                                                                                                                        | Subject Name              | Category | Credits                  | Inst. Hours | Marks |
|                                                                                                                                                                                                                                     | PHYSICS CORE PRACTICAL II | CC IV    | 2                        | 3           | 60    |
| Apply their knowledge gained about the concept of heat and sound waves, resonance, calculate frequency of ac mains set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results |                           |          |                          |             |       |

#### METHOD OF EVALUATION

| Continuous Internal Assessment | End Semester examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 40                             | 60                       | 100   |       |

#### Any Eight of the below list

1. Determination of specific heat by cooling – Newton's law graphical method.
2. Determination of thermal conductivity of good conductor by Forbe's method.
3. Determination of thermal conductivity of bad conductor by Lee's disc method.
4. Determination of thermal conductivity of bad conductor by Charlton's method.
5. Determination of specific heat capacity of solid.
6. Determination of specific heat of liquid by Joule's electrical heating method (applying radiation correction by Barton's correction/graphical method).
7. Determination of Latent heat of a vaporization of a liquid.
8. Verification of Stefan's- Boltzman's law.
9. Determination of thermal conductivity of rubber tube.
10. Determination of solar constant
11. Determination of emissive power of surface using spherical calorimeter.
12. Helmholtz resonator.
13. Velocity of sound through a wire using Sonometer.
14. Determination of velocity of sound using Kund's tube.
15. Determination of frequency of an electrically maintained tuning fork
16. To verify the laws of transverse vibration using sonometer.
17. To verify the laws of transverse vibration using Melde's apparatus.
18. To compare the mass per unit length of two strings using Melde's apparatus.
19. Frequency of AC by using sonometer.

### COURSE OUTCOMES:

At the end of the course, the student will be able to:

|                                                                                               |                                                                                                                                                                                                                                                                                                                                                                |              |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>CO1</b>                                                                                    | Define key concepts such as specific heat, thermal conductivity, latent heat, and emissive power, and identify the fundamental principles involved in each measurement.                                                                                                                                                                                        | <b>K1</b>    |
| <b>CO2</b>                                                                                    | Articulate the processes involved in various experiments such as Newton's law of cooling, Forbe's method, Lee's disc method, and Joule's electrical heating method, including the significance of each method in thermal analysis.                                                                                                                             | <b>K2</b>    |
| <b>CO3</b>                                                                                    | Apply theoretical knowledge to perform experiments for determining specific heat capacity, thermal conductivity, and latent heat, utilizing appropriate equipment and techniques.                                                                                                                                                                              | <b>K3</b>    |
| <b>CO4</b>                                                                                    | Analyze results from experiments (such as graphical methods for specific heat) and assess the validity of their findings in relation to established theories, including Stefan's-Boltzmann law.                                                                                                                                                                | <b>K4</b>    |
| <b>CO5</b>                                                                                    | Develop experimental designs for measuring thermal properties, integrating knowledge from various physics domains to create innovative solutions to measurement challenges. Critically assess how thermal properties influence technology, environmental issues, and everyday applications, discussing the implications of their findings in broader contexts. | <b>K5,K6</b> |
| <b>K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate ; K6 – Create;</b> |                                                                                                                                                                                                                                                                                                                                                                |              |

### MAPPING WITH PROGRAM OUTCOMES:

Map Course Outcomes (CO) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) on a 4-point scale of VERY STRONG (4), STRONG (3) MEDIUM (2) and LOW (1).

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|
| <b>CO1</b> | 4   | 2   | 2   | 2   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 1    | 2    |
| <b>CO2</b> | 4   | 3   | 3   | 2   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 2    | 2    |
| <b>CO3</b> | 4   | 2   | 3   | 2   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 2    | 2    |
| <b>CO4</b> | 3   | 2   | 4   | 3   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 1    | 1    |
| <b>CO5</b> | 4   | 2   | 3   | 3   | 1   | 1   | 1   | 4    | 3    | 4    | 3    | 2    | 2    | 2    |

UP2SEI

| SEC – I PHYSICS OF EVERYDAY LIFE                                                                                                                                                                                        |                          |          |         | I YEAR – SECOND SEMESTER |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|----------|---------|--------------------------|-------|
| Subject Code                                                                                                                                                                                                            | Subject Name             | Category | Credits | Inst. Hours              | Marks |
|                                                                                                                                                                                                                         | PHYSICS OF EVERYDAY LIFE | SEC I    | 2       | 2                        | 75    |
| To know where all physics principles have been put to use in daily life and appreciate the concepts with a better understanding also to know about Indian scientists who have made significant contributions to Physics |                          |          |         |                          |       |

### UNIT-I MECHANICAL OBJECTS

Spring scales – bouncing balls –roller coasters – bicycles –rockets and space travel.

### UNIT-II OPTICAL INSTRUMENTS AND LASER

Vision corrective lenses – polaroid glasses – UV protective glass – polaroid camera – colour photography – holography and laser.

### UNIT-III PHYSICS OF HOME APPLIANCES

Bulb – fan – hair drier – television – air conditioners – microwave ovens – vacuum cleaners

### UNIT-IV SOLAR ENERGY

Solar constant – General applications of solar energy – Solar water heaters – Solar Photo – voltaic cells – General applications of solar cells.

### UNIT-V INDIAN PHYSICIST AND THEIR CONTRIBUTIONS

C.V.Raman, HomiJehangirBhabha, Vikram Sarabhai, Subrahmanyam Chandrasekhar, Venkatraman Ramakrishnan, Dr. APJ Abdul Kalam and their contribution to science and technology.

### BOOKS FOR STUDY:

1. The Physics in our Daily Lives, Umme Ammara, Gugucol Publishing,Hyderabad,
- 2.For the love of physics, Walter Lawin, Free Press, New York, 2011.

### QUESTION PATTERN:

| SECTION - A                                                       |
|-------------------------------------------------------------------|
| 1 question from each unit (Either or type questions)<br>(5X15=75) |

## COURSE OUTCOMES:

At the end of the course, the student will be able to:

|                                                                                               |                                                                                                                                                                                                                                                                                                                                                                      |              |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>CO1</b>                                                                                    | Define fundamental concepts related to mechanical objects (like spring scales and rockets) and optical instruments (like corrective lenses and lasers), demonstrating an understanding of their basic principles.                                                                                                                                                    | <b>K1</b>    |
| <b>CO2</b>                                                                                    | Articulate how various home appliances (such as bulbs, fans, and microwaves) operate based on physical laws, including the principles of electricity and thermodynamics.                                                                                                                                                                                             | <b>K2</b>    |
| <b>CO3</b>                                                                                    | Apply their understanding of solar energy concepts to describe the operation and application of solar water heaters and photovoltaic cells in real-life scenarios.                                                                                                                                                                                                   | <b>K3</b>    |
| <b>CO4</b>                                                                                    | Analyze the contributions of notable Indian physicists (like C.V. Raman and Homi Bhabha) and evaluate their significance in the advancement of scientific knowledge and technology.                                                                                                                                                                                  | <b>K4</b>    |
| <b>CO5</b>                                                                                    | Synthesize concepts from mechanics, optics, and energy systems to develop innovative solutions or projects, showcasing interdisciplinary thinking. Critically assess how advancements in physics (such as laser technology and solar energy applications) can address current and future societal challenges, including sustainability and technological innovation. | <b>K5,K6</b> |
| <b>K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate ; K6 – Create;</b> |                                                                                                                                                                                                                                                                                                                                                                      |              |

## MAPPING WITH PROGRAM OUTCOMES:

Map Course Outcomes (CO) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) on a 4-point scale of VERY STRONG (4), STRONG (3) MEDIUM (2) and LOW (1).

|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|
| <b>CO1</b> | 4   | 2   | 3   | 2   | 1   | 1   | 1   | 3    | 3    | 4    | 2    | 1    | 1    | 1    |
| <b>CO2</b> | 4   | 3   | 4   | 2   | 1   | 1   | 2   | 3    | 3    | 4    | 2    | 1    | 1    | 1    |
| <b>CO3</b> | 4   | 2   | 3   | 2   | 2   | 1   | 1   | 3    | 3    | 4    | 2    | 1    | 1    | 1    |
| <b>CO4</b> | 4   | 2   | 4   | 3   | 2   | 1   | 1   | 3    | 3    | 4    | 2    | 1    | 1    | 1    |
| <b>CO5</b> | 4   | 2   | 4   | 3   | 3   | 1   | 1   | 3    | 4    | 4    | 3    | 2    | 1    | 1    |

| EVS – ENVIRONMENTAL STUDIES |                       |          | I YEAR - FIRST SEMESTER |             |       |
|-----------------------------|-----------------------|----------|-------------------------|-------------|-------|
| Subject Code                | Subject Name          | Category | Credits                 | Inst. Hours | Marks |
|                             | ENVIRONMENTAL STUDIES | EVS      | 2                       | 2           | 75    |

#### UNIT:1 The Multidisciplinary nature of environmental studies

- ❖ Definition ,scope and importance
- ❖ Need for public awareness
- ❖ Natural resources
- ❖ Renewable and non- renewable resources
- ❖ Natural resources and associated problems

#### Unit –II Biodiversity and its conversation

- ❖ Introduction- definition, genetic , species and ecosystem diversity
- ❖ Biodiversity at global, national and local levels
- ❖ India as mega- diversity nation
- ❖ Hot – spots of biodiversity
- ❖ Conservation of Biodiversity. In-Situ and Ex-situ conservation of biodiversity

#### Unit- III Environmental problems

- ❖ Definition
- ❖ Causes , effects and control measures of
- ❖ Air pollution
- ❖ Water pollution
- ❖ Soil pollution
- ❖ Marine pollution
- ❖ Noise pollution
- ❖ Thermal pollution
- ❖ Nuclear hazard (Radioactive pollution)
- ❖ Solid waste management: causes effects and control measure of urban and industrial wastes.
- ❖ Role of an individual in prevention of pollution
- ❖ Pollution case studies
- ❖ Disaster management: floods earthquake, cyclone and landslides.

#### UNIT- IV

- ❖ From un sustainable to sustainable development
- ❖ Urban problems related to energy
- ❖ Water conservation rain water harvesting watershed management
- ❖ Resettlement and rehabilitation of people , its problems and concerns case studies
- ❖ Environmental ethics: issues and possible solution
- ❖ Climate change, global warming acid rain ozone layer depletion
- ❖ Nuclear accidents and holocaust, case studies.
- ❖ Wasteland reclamation
- ❖ Consumerism and waste products
- ❖ Environment protection act
- ❖ Air (prevention and control pollution)
- ❖ Water (prevention and control pollution)
- ❖ Wildlife protection Act
- ❖ Forest conservation Act
- ❖ Issues involved in enforcement of environmental legislation
- ❖ Public awareness.

#### UNIT-V Human population and environment

- ❖ Population growth, variations among nations
- ❖ Population explosion – family welfare programme
- ❖ Environment and human health
- ❖ Human rights
- ❖ HIV/ AIDS
- ❖ Women and child welfare
- ❖ Role of information technology in environmentl human health
- ❖ Case studies.

| CC - V                                                                                                                                                                                                                                                                                                                                    |              | II YEAR- THIRD SEMESTER |   |   |   |         |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------|---|---|---|---------|-------------|
| Subject Code                                                                                                                                                                                                                                                                                                                              | Subject Name | Category                | L | T | P | Credits | Inst. Hours |
|                                                                                                                                                                                                                                                                                                                                           | MECHANICS    |                         |   |   |   |         |             |
|                                                                                                                                                                                                                                                                                                                                           | MECHANICS    | CC-V                    | 6 |   |   | 3       | 6           |
| <b>COURSE OBJECTIVES</b><br>This course allows the students: To have a basic understanding of the laws and principles of mechanics; To apply the concepts of forces existing in the system; To understand the forces of physics in everyday life; To visualize conservation laws; To apply Lagrangian equation to solve complex problems. |              |                         |   |   |   |         |             |

**UNIT-I: LAWS OF MOTION:** Newton's Laws – forces – equations of motion – frictional force – motion of a particle in a uniform gravitational field – types of everyday forces in Physics.

**Gravitation:** Classical theory of gravitation–Kepler's laws, Newton's law of gravitation – Determination of G by Cavendish's method – Earth-moon system – weightlessness – earth satellites – parking orbit – earth density – mass of the Sun – gravitational potential – velocity of escape – satellite potential and kinetic energy –Einstein's theory of gravitation.

**UNIT-II: CONSERVATION LAWS OF LINEAR AND ANGULAR MOMENTUM:**

conservation of linear and angular momentum -- Internal forces and momentum conservation – center of mass – examples – general elastic collision of particles of different masses – system with variable mass – examples – conservation of angular momentum – torque due to internal forces – torque due to gravity – angular momentum about center of mass – proton scattering by heavy nucleus.

**UNIT-III: CONSERVATION LAWS OF ENERGY:** Introduction – significance of conservation laws – law of conservation of energy concepts of work- power – energy – conservative forces – potential energy and conservation of energy in gravitational and electric field – examples – non-conservative forces – general law of conservation of energy.

**UNIT-IV: RIGID BODY DYNAMICS:** translational and rotational motion – angular momentum -- moment of inertia – general theorems of moment of inertia – examples – rotation about fixed axis – kinetic energy of rotation – examples – body rolling

along a plane surface – body rolling down an inclined plane – gyroscopic precession – gyrostatic applications.

**UNIT-V: LAGRANGIAN MECHANICS:** generalized coordinates – degrees of freedom – constraints – principle of virtual work and D'Alembert's Principle – Lagrange's equation from D'Alembert's principle – application – simple pendulum.

**UNIT-VI: PROFESSIONAL COMPONENTS:**

expert lectures – seminars – webinars – industry inputs – social accountability – patriotism

**TEXT BOOKS**

1. J.C.Upadhyaya, 2019, Classical Mechanics, Himalaya Publishing house, Mumbai.
2. P.DuraiPandian, LaxmiDuraiPandian, MuthamizhJayapragasam, 2005, Mechanics, 6<sup>th</sup> revised edition,
3. D. S.Mathur and P. S.Hemne, 2000, Mechanics, Revised Edition, S.Chand and Co.
4. Narayanamurthi. M. and Nagarathnam. N, 1998, Dynamics. The National Publishing, Chennai.
5. Narayanamurthi. M. and Nagarathnam, N, 1982, Statics, Hydrostatics and Hydrodynamics, The National Publishers, Chennai.

**REFERENCE BOOKS**

1. Goldstein Herbert, 1980, Classical Mechanics. U.S.A: Addison and Wesley.
2. Halliday, David and Robert, Resnick, 1995, Physics Vol.I. New Age, International, Chennai.
3. Halliday, David Robert, Resnick, and Walker Jearl, 2001, Fundamentals of Physics John Wiley, New Delhi.

**WEB RESOURCES**

1. [https://youtu.be/X4\\_K-XLUIB4](https://youtu.be/X4_K-XLUIB4)
2. <https://nptel.ac.in/courses/11510/115>
3. <https://www.youtube.com/watch?v=p075LPq3Eas>
4. [https://www.youtube.com/watch?v=mH\\_pS6fruyg](https://www.youtube.com/watch?v=mH_pS6fruyg)
5. [https://onlinecourses.nptel.ac.in/noc22\\_me96/preview](https://onlinecourses.nptel.ac.in/noc22_me96/preview)
6. <https://www.youtube.com/watch?v=tdkFc88Fw-M>
7. [https://onlinecourses.nptel.ac.in/noc21\\_me70/preview](https://onlinecourses.nptel.ac.in/noc21_me70/preview)

*for*

## COURSE OUTCOMES:

At the end of the course, the student will be able to:

|                 |     |                                                                                                                                                        |
|-----------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| COURSE OUTCOMES | CO1 | Understand the Newton's Law of motion, understand general theory of relativity, Kepler's laws and Realize the basic principles behind planetary motion |
|                 | CO2 | Acquire the knowledge on the conservation laws                                                                                                         |
|                 | CO3 | Apply conservation law and calculate energy of various systems, understand and differentiate conservative and non-conservative forces                  |
|                 | CO4 | Gain knowledge on rigid body dynamics and solve problems based on this concept                                                                         |
|                 | CO5 | Appreciate Lagrangian system of mechanics, apply D'Alembert's principle                                                                                |

:

## MAPPING WITH PROGRAM OUT COMES:

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PO | PSO4 | PSO5 |
|-----|-----|-----|-----|-----|-----|------|------|----|------|------|
| CO1 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    |    | ✓    | ✓    |
| CO2 | ✓   | ✓   | ✓   |     | ✓   |      | ✓    | ✓  | ✓    | ✓    |
| CO3 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    |      | ✓  |      | ✓    |
| CO4 |     | ✓   | ✓   | ✓   |     | ✓    | ✓    |    | ✓    | ✓    |
| CO5 | ✓   | ✓   |     | ✓   | ✓   | ✓    | ✓    | ✓  | ✓    |      |

## METHOD OF EVALUATION

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 25                             | 75                       | 100   |       |

| CC - V                                                                                                                                                                                                                                                                                                                                                                      |                                                         | II YEAR- THIRD SEMESTER |   |   |   |         |             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-------------------------|---|---|---|---------|-------------|
| Subject Code                                                                                                                                                                                                                                                                                                                                                                | Subject Name                                            | Category                | L | T | P | Credits | Inst. Hours |
|                                                                                                                                                                                                                                                                                                                                                                             | ELECTRICITY<br>MAGNETISM<br>AND OPTICS<br>PRACTICAL III |                         |   |   |   |         |             |
|                                                                                                                                                                                                                                                                                                                                                                             |                                                         | CC-Vi                   |   |   | 3 | 2       | 3           |
| <b>COURSE OBJECTIVES</b><br>Construct circuits to learn about the concept of electricity, current, resistance in the path of current, different parameters that affect a circuit. Set up experiments, observe, analyse and assimilate the concept<br><br>Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results. |                                                         |                         |   |   |   |         |             |

U23PC306P

UPC 306P

#### REFERENCE BOOKS:

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, 2007, Practical Physics and Electronics, S. Viswanathan (Printers & Publishers), Pvt., Ltd,

#### METHOD OF EVALUATION

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 40                             | 60                       | 100   |       |

#### Minimum of Eight Experiments from the list:

1. Calibration of low range voltmeter using potentiometer
2. Calibration of low range ammeter using potentiometer.
3. Measurement of resistances using potentiometer.
4. Determination of field along the axis of a current carrying circular coil.
5. Determination of resistance and specific resistance using Carey Foster's bridge.
6. Determination of figure of merit of table/BG /spot galvanometer.
7. Comparison of EMF of two cells using table/spot galvanometer/BG.
8. Comparison of capacitance using BG/spot galvanometer.
9. Verification of Ohm's law.
10. Determination of Refractive index of the material of the prism using spectrometer.
11. Determination of Radius of Curvature of the lens- Newton's Rings
12. Determination of Dispersive power of prism using Spectrometer.

U23 P 3

| SEC                                                                                                                                                                       |                              | II YEAR- THIRD SEMESTER |   |   |   |         |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------|---|---|---|---------|------------|
| Subject Code                                                                                                                                                              | SubjectName                  | Category                | L | T | P | Credits | Inst.Hours |
|                                                                                                                                                                           | HOME ELECTRICAL INSTALLATION | SEC                     | 2 |   |   | 2       | 2          |
| <b>Learning Objective:</b> The students will get knowledge on electrical instruments, installations and domestic wiring techniques with safety precautions and servicing. |                              |                         |   |   |   |         |            |

**UNIT-I-SIMPLE ELECTRICAL CIRCUITS:** charge, current, potential difference, resistance – simple electrical circuits – DC ammeter, voltmeter, ohmmeter – Ohm's law – difference between DC and AC – advantages of AC over DC – electromagnetic induction – transformers – inductors/chokes – capacitors/condensers – impedance – AC ammeter, voltmeter – symbols and nomenclature

**UNIT-II-TRANSMISSION OF ELECTRICITY:** production and transmission of electricity – concept of power grid – Series and parallel connections – technicalities of junctions and loops in circuits – transmission losses (qualitative) – roles of step-up and step-down transformers – quality of connecting wires – characteristics of single and multicore wires

**UNIT-III-ELECTRICAL WIRING:** different types of switches – installation of two way switch – role of sockets, plugs, sockets - Wiring system – Electric supply to house and factories – Types of wiring – ISI rules – Megger testing – Earthing.

**UNIT-IV-POWER RATING AND POWER DELIVERED:** conversion of electrical energy in to different forms – work done by electrical energy -- power rating of electrical appliances – energy consumption – electrical energy unit in kWh – calculation of EB bill – Joule's heating – useful energy and energy loss – single and three phase connections – Measures to save electrical energy -- energy audit

**UNIT-V- SAFETY MEASURES:** Insulation for wires – colour specification for mains, return and earth – Understanding of fuse

and circuit breakers – types of fuse: kit-kat, HRC, cartridge, MCB, ELCB – purpose of earth line – lighting arrestors – short circuiting and over loading – electrical safety – tips to avoid electrical shock – first aid for electrical shock – fire safety for electric current

### TEXT BOOKS

1. Complete Beginners Guide to Rough in Electrical Wiring: by Kevin Ryan (2022).
2. Basic Electrical Engineering, A.L.Anwani and I.Anwani. 2003, Dhan pat Rai and Co(P) Ltd. Delhi.
3. Electrical Instruments and Measurement Techniques – William D.Cooper – PHI Pvt Co., New Delhi, 1997.
4. Black and Decker Advanced Home Wiring, 5th Edition: Backup Power - Panel Upgrades - AFCI Protection - "Smart" Thermostats, by Editors of Cool Springs Press, (2018).
5. Textbook of Electrical Technology ,B.L.Theraja, Vol.1 & 2.

### METHOD OF EVALUATION

UP3 I+I

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 25                             | 75                       | 100   |       |

*Signature*

V23 P3EP

| SEC                                                                                                                                                   |                | II YEAR- THIRD SEMESTER |   |   |   |         |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------|---|---|---|---------|-------------|
| Subject Code                                                                                                                                          | Subject Name   | Category                | L | T | P | Credits | Inst. Hours |
|                                                                                                                                                       | ENERGY PHYSICS | SEC                     | 2 |   |   | 2       | 2           |
| Learning objectives:<br><br>To get the understanding of the conventional and Non-conventional energy sources , their conservation and storage systems |                |                         |   |   |   |         |             |

**UNIT I INTRODUCTION TO ENERGY SOURCES:** energy consumption as a measure of prosperity – world energy future – energy sources and their availability – conventional energy sources – non-conventional and renewable energy sources – comparison – merits and demerits.

**UNIT-II SOLAR ENERGY:** solar energy Introduction – solar constant – solar radiation at the Earth's surface – solar radiation geometry – Solar radiation measurements – solar radiation data – solar energy storage and storage systems – solar pond – solar cooker – solar water heater – solar greenhouse – types of greenhouses – solar cells

**UNIT-III WIND ENERGY:** introduction – nature of the wind -- basic principle of wind energy conversion -- wind energy data and energy estimation

– basic components of Wind Energy Conversion Systems (WECS) – advantages and disadvantages of WECS – applications – tidal energy

**UNIT-IV BIOMASS ENERGY:** introduction – classification – biomass conversion technologies – photosynthesis – fermentation – biogas generation – classification of biogas plants – anaerobic digestion for biogas -- wood gasification – advantages and disadvantages.

**UNIT-V ENERGY STORAGE:** importance of energy storage- batteries – lead acid battery – nickel-cadmium battery – fuel cells – types of fuel cells – advantages and disadvantages of fuel cells – applications of fuel cells – hydrogen storage.

### TEXT BOOKS

1. G.D.Rai, Non-Conventional Sources of Energy, Khanna Publishers, 2009, 4<sup>th</sup> Edn.
2. S. P. Sukhtme, J. K. Nayak, Solar Energy, Principles of Thermal Collection and Storage, McGraw Hill, 2008, 3<sup>rd</sup> Edn.
- D. P. Kothari, K. P. Singal, Rakesh Rajan, PHI Learning Pvt Ltd. 2011, 2<sup>nd</sup> Edn.

### REFERENCE BOOKS

1. John Twidell and Tony Weir, Renewable Energy Resources, Taylor and Francis, 2005, 2<sup>nd</sup> Edn.
2. S.A. Abbasi and Nasema Abbasi, Renewable Energy sources and their environmental impact, PHI Learning Pvt. Ltd, 2008.
3. M. P. Agarwal, Solar Energy, S. Chand and Co. Ltd., New Delhi, 1982
- H. C. Jain, Non-Conventional Sources of Energy, Sterling Publishers, 1986

### METHOD OF EVALUATION:

| Continuous Assessment | Internal | End Semester Examination | Total | Grade |
|-----------------------|----------|--------------------------|-------|-------|
| 25                    |          | 75                       | 100   |       |

UPC407

U23PC 407

| CC - VII                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                          | II YEAR - FOURTH SEMESTER |   |   |   |         |            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------------|---|---|---|---------|------------|
| Subject Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Subject Name             | Category                  | L | T | P | Credits | Institutes |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | OPTICS AND LASER PHYSICS | CC - VII                  |   |   |   | 5       | 5          |
| <b>COURSE OBJECTIVES</b><br>To provide an in-depth understanding of the basics of various phenomena in geometrical and wave optics; To explain the behavior of light in different mediums; To understand the differences in the important phenomena namely interference, diffraction and Polarization and apply the knowledge in day to day life; To understand the design of optical systems and methods to minimise aberrations; To understand the working and applications of laser |                          |                           |   |   |   |         |            |

**UNIT-I: LENS AND PRISMS:** Fermat's principle of least time – postulates of geometrical optics – thick and thin lenses – focal length, critical thickness, power and cardinal points of a thick lens – narrow angled prisms.

*Lens:* aberrations: spherical aberration, chromatic aberrations, coma, and astigmatism – curvature of the field – distortion – chromatic aberrations methods.

*Prism:* dispersion, deviation, aberrations – applications rainbows.

*Eyepieces:* advantage of an eyepiece over a simple lens – Huygen's and Ramsden's eyepieces, construction and working – merits and demerits of the eyepiece.

*Resolving power:* Rayleigh's criterion for resolution – limit of resolution for the eye – resolving power of, (i) Prism (ii) grating (iii) telescope

**UNIT-II: INTERFERENCE:** division of wave front, Fresnel's biprism – fringes with white light – division of amplitude: interference in thin films due to, (i) reflected light, (ii) transmitted light – colours of thin films applications – air wedge – Newton's rings.

*Interferometers:* Michelson's interferometer – applications, (i) determination of the wavelength of a monochromatic source of light, (ii) determination of the wavelength and separation  $D_1$  and  $D_2$  lines

of sodium light, (iii) determination of a thickness of a mica sheet.

**UNIT-III: DIFFRACTION:** Fresnel's assumptions – zone plate – action of zone plate for an incident spherical wave front – differences between a zone plate and a convex lens – Fresnel type of diffraction – diffraction pattern due to a straight edge – positions of maximum and minimum intensities – diffraction due to a narrow slit – Fraunhofer type of diffraction – Fraunhofer diffraction at a single slit – plane diffraction gratings – experiment to determine wavelengths – width of principal maxima.

**UNIT-IV: POLARISATION:** optical activity – optically active crystals – polarizer and analyser – double refraction – optic axis, principal plane – Huygen's explanation of double refraction in uniaxial crystals – polaroids and applications – circularly and elliptically polarized light – quarter wave plate – half wave plate – production and detection of circularly and elliptically polarized lights – Fresnel's explanation – specific rotation – Laurent half shade polarimeter – experiment to determine specific rotatory power.

**UNIT-V: LASERS:** general principles of lasers – properties of lasers: action – spontaneous and stimulated emission – population inversion – optical pumping – He-Ne laser (principle and working) – CO<sub>2</sub> laser (principle and working) semiconductor laser – laser applications – holography.

**UNIT-VI: PROFESSIONAL COMPONENTS:** expert lectures – seminars – webinars – industry inputs – social accountability – patriotism

### TEXT BOOKS

1. Subramaniam. N and Brijlal, 2014, Optics, 25<sup>th</sup> Ed, S. Chand and Co.
2. P.R. Sasikumar, 2012, Photonics, PHIPvt Ltd, New Delhi.
3. V. Rajendran, 2012, Engineering Physics, Tata McGraw Hill.

### REFERENCE BOOKS

1. Sathyaprakash, 1990, Optics, VII edition, Ratan Prakashan Mandhir, New Delhi.
2. Ajoy Ghatak, 2009, Optics, 4<sup>th</sup> edition, PHIPvt Ltd, New Delhi
3. D. Halliday, R. Resnick and J. Walker, 2001, Fundamentals of Physics, 6<sup>th</sup> edition, Wiley, New York.
4. 7. Jenkins A. Francis and White, 2011, Fundamentals of Optics, 4<sup>th</sup> edition, McGraw Hill Inc., New Delhi.

### WEB SOURCES:

1. <https://science.nasa.gov/ems/>
2. <https://www.youtube.com/watch?v=tL3rNc1C0qQ&list=RDcM>

UCzwo7UIGkb-8Pr6svxWo-LAanc\_start\_radio=1andt=2472

3. <https://science.nasa.gov/ems/>

4. <https://imagine.gsfc.nasa.gov/educators/gammaraybursts/imagine/index.html>

<http://www.thephysicsmill.com/2014/03/23/sky-blue-lord-rayleigh-sir-raman-scattering/>

### COURSE OUTCOMES:

|                        |            |                                                                                                                                                       |
|------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COURSE OUTCOMES</b> | <b>CO1</b> | Outline basic knowledge of methods of rectifying different defects in lenses, articulate technological applications of eyepieces                      |
|                        | <b>CO2</b> | Discuss the principle of superposition of wave, use these ideas to understand the wave nature of light through working of interferometer              |
|                        | <b>CO3</b> | Extend the knowledge about nature of light through diffraction techniques; apply mathematical principles to analyse the optical instruments           |
|                        | <b>CO4</b> | Interpret basic formulation of polarization and gain knowledge about polarimeter, appraise its usage in industries                                    |
|                        | <b>CO5</b> | Relate the principles of optics to various fields of IR, Raman and UV spectroscopy and understand their instrumentation and application in industries |

### MAPPING WITH PROGRAM OUT COMES:

|             | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|-------------|-----|-----|-----|-----|-----|------|------|------|------|------|
| <b>CO1S</b> |     |     | ✓   |     |     |      | ✓    | ✓    |      |      |
| <b>CO2M</b> |     | ✓   |     | ✓   |     | ✓    |      |      | ✓    | ✓    |
| <b>CO3S</b> |     |     | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    |      |      |
| <b>CO4S</b> |     |     | ✓   |     |     | ✓    |      |      | ✓    |      |
| <b>CO5S</b> |     |     | ✓   |     | ✓   | ✓    |      | ✓    | ✓    | ✓    |

### METHOD OF EVALUATION:

| Continuous Internal Assessment | End Examination | Semester | Total | Grade |
|--------------------------------|-----------------|----------|-------|-------|
| 25                             | 75              |          | 100   |       |

| CC - VIII                                                                                                                                                                                                                                                                                                                                                                       |                                                        | II YEAR- FOURTH SEMESTER |   |   |   |         |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------|---|---|---|---------|------------|
| Subject Code                                                                                                                                                                                                                                                                                                                                                                    | Subject Name                                           | Category                 | L | T | P | Credits | Inst Hours |
|                                                                                                                                                                                                                                                                                                                                                                                 | ELECTRICITY<br>MAGNETISM<br>AND OPTICS<br>PRACTICAL IV |                          |   |   | 3 | 2       | 3          |
| <b>COURSE OBJECTIVES</b><br><br>Construct circuits to learn about the concept of electricity, current, resistance in the path of current, different parameters that affect a circuit. Set up experiments, observe, analyse and assimilate the concept<br><br>Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results. |                                                        |                          |   |   |   |         |            |

UpC408P

10. Determination of Refractive index the liquid using hollow prism and spectrometer.
11. Determination of e.m.f of thermo couple using potentiometer.
12. Determination of Dispersive power of grating using Spectrometer.
13. Determination of Resolving power of grating using Spectrometer.
14. Determination of thickness of a wire by forming Air wedge.

#### METHOD OF EVALUATION

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 40                             | 60                       | 100   |       |

:

#### Minimum of Eight Experiments from the list:

1. Verification of Kirchoff's 1 law
2. Potentiometer - calibration of high range voltmeter.
3. Potentiometer - calibration of high range Ammeter
4. Potentiometer - Measurement of internal resistance
5. Potentiometer- Comparison of EMF of the Cells using variable/spot galvanometer/B.G
6. Potentiometer- Determination of temperature co-efficient of resistance.
7. Careyfooster's bridge- Determination of temperature co-efficient of resistance..
8. Verification of Newton's formula for a lens separated by a distance.
9. Determination of refractive index of a given liquid by forming liquid lens

#### REFERENCE BOOKS:

2. C.C. Ouseph, U.J. Rao, V. Vijayendran, 2007, Practical Physics and Electronics, S. Viswanathan (Printers & Publishers), Pvt., Ltd,

UP4MP / U23P4MP

| SEC                                                                                                            |                 | II YEAR- FOURTH SEMESTER |   |   |   |         |            |
|----------------------------------------------------------------------------------------------------------------|-----------------|--------------------------|---|---|---|---------|------------|
| Subject Code                                                                                                   | SubjectName     | Category                 | L | T | P | Credits | Inst.Hours |
|                                                                                                                | MEDICAL PHYSICS | SEC                      | 2 |   |   | 2       | 2          |
| <b>Learning Objective:</b> To present an overview of how the instruments are employed for medical diagnostics. |                 |                          |   |   |   |         |            |

### UNIT-I

**MECHANICS OF HUMAN BODY:** Static, Dynamic and Frictional forces in the body – Heat and temperature – Temperature scales- Clinical thermometer – Thermography – Heat Therapy – Cryogenics in medicine – Heat losses from body – Pressure in the body – Pressure in Skull, Eye and Urinary Badder.

### UNIT-II

**DIAGNOSTIC DEVICES :**X-ray machine – Comparision between Radiography and Fluroscopy – Angiography (Basic concept) – Thermography – Comparision between normal and cancer cells.

### UNIT-III

**THERAPEUTIC DEVICES:** External and internal defibrillators – ac defibrillator – DC defibrillator – Pace maker – Comparision between External and internal pace makers.

### UNIT-IV

**LASER IN MEDICINE:** Laser – Principle – Properties – General application – Laser based blood cell counting – Laser surgery – Advantages

### UNIT-V

**ULTRASONICS IN MEDICINE:** Ultrasonics -- Properties – Ultrasonic propagation through tissues – Ultrasonic diathermy – B mode Ultrascan – applications of diagnostic ultrasound.

### TEXT BOOKS

1. Medical Physics, John R. Cameron, University of Wisconsin, Madison & James G. Skofronick, Florida State University, Tallahassee, A wileyinterscience Publication, John Wiley & sons, Singapore, 2005
2. Biomedical Instrumentation(second edition), Dr. M. Arumugam, Anuradha Publications PVT, Kumbakonam, Biomedical Instrumentation and Measurements, Leslie Cromwell, Fred J. Weibell, Enrich A.Pfeiffer, Prentice Hall of India, PVT, New Delhi, Second Edition , 2005

### METHOD OF EVALUATION;

| Continuous InternalAssessment | End Examination | Semester | Total | Grade |
|-------------------------------|-----------------|----------|-------|-------|
| 25                            | 75              |          | 100   |       |

| SEC                                                                                                                                                                                                                                                                                                                                                           |               | II YEAR- FOURTH SEMESTER |   |   |   |         |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------|---|---|---|---------|-------------|
| Subject Code                                                                                                                                                                                                                                                                                                                                                  | Subject Name  | Category                 | L | T | P | Credits | Inst. Hours |
|                                                                                                                                                                                                                                                                                                                                                               | ASTRO PHYSICS | SEC                      | 2 |   |   | 2       | 2           |
| <b>LEARNING OBJECTIVES</b><br><br>This course intends to introduce principles of astrophysics describing the science of formation and evolution of stars and interpretation of various heavenly phenomena and provide an understanding of the physical nature of celestial bodies along with the instrumentation and techniques used in astronomical research |               |                          |   |   |   |         |             |

**UNIT-I:**

**TELESCOPES:** Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes – detectors and image processing – radio telescopes – Hubble space telescope.

**UNIT-II**

**SOLAR SYSTEM:** Bode's law of planetary distances – meteors, meteorites, comets, asteroids – Kuiper belt – Oort cloud – detection of gravitational waves – recent advances in astrophysics.

**UNIT-III**

**ECLIPSES:** types of eclipses – solar eclipse – total and partial solar eclipse – lunar eclipse – total and partial lunar eclipse – transits.

**THE SUN:** physical and orbital data – solar atmosphere – photosphere – chromosphere – solar corona – prominences – sunspots – 11 year solar cycle – solar flares.

**UNIT-IV**

**STELLAR EVOLUTION:** H-R diagram – birth and death of low mass, intermediate mass and massive stars – Chandrasekar limit – white dwarfs – neutron stars – pulsars – black holes – supernovae.

**GALAXIES:** classification of galaxies – galaxy clusters – interactions of galaxies, dark matter and super clusters – evolving universe.

**UNIT-V****ACTIVITIES IN ASTROPHYSICS:**

- Basic construction of telescope
  - Develop models to demonstrate eclipses/planetary motion
  - Night sky observation
  - Visit to any one of the National Observatories
  - Evaluation of the student's performance in the Science Expo related to Astrophysics.
- Any three activities to be done compulsorily.

**TEXT BOOKS**

- Baidyanath Basu, (2001). An introduction to Astrophysics, Second printing, Prentice – Hall of India (P) Ltd, New Delhi
- K.S. Krishnaswamy, (2002), Astrophysics – a modern perspective, New Age International (P) Ltd, New Delhi.

Shylaja, B.S. and Madhusudan, H.R., (1999), Eclipse: A Celestial Shadow Play, Orient Black Swan

**METHOD OF EVALUATION:**

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 25                             | 75                       | 100   |       |

| GEC III                                                                                                                                                     |                      | II YEAR- THIRD SEMESTER |   |   |   |         |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------|---|---|---|---------|-------------|
| Subject Code                                                                                                                                                | Subject Name         | Category                | L | T | P | Credits | Inst. Hours |
|                                                                                                                                                             | BASIC ALLIED PHYSICS | GEC III                 | 4 |   |   | 4       | 4           |
| <b>Learning Objectives:</b><br>To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics. |                      |                         |   |   |   |         |             |

U23PGE1

UPGE3

**UNIT-I: WAVES, OSCILLATIONS AND ULTRASONICS:** simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – application of ultrasonics: medical field – ultrasonography

**UNIT-II: PROPERTIES OF MATTER:** *Elasticity:* elastic constants – bending of beam – theory of non-uniform bending – determination of Young's modulus by non-uniform bending.

*Viscosity:* streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille's formula – comparison of viscosities – burette method,

*Surface tension:* definition – molecular theory – droplets formation – shape, size and lifetime – drop weight method – interfacial surface tension.

**UNIT-III: HEAT AND THERMODYNAMICS:** Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen – Linde's process of liquefaction of air – liquid Oxygen for medical purpose – importance of cryocoolers – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot's cycle – efficiency – entropy

**UNIT-IV: ELECTRICITY AND MAGNETISM:** potentiometer – principle – measurement of thermo e.m.f using potentiometer – magnetic field due to a current carrying conductor – Biot-Savart's law – field along the axis of the coil carrying current – peak, average and RMS

values of ac current and voltage – power factor and current values in an AC circuit.

**UNIT-V: DIGITAL ELECTRONICS :** Number system- Decimal, Binary, Octal, Hexadecimal and interconversions -logic gates, OR, AND, NOT, NAND, NOR, EXOR logic gates – universal building blocks – Boolean algebra – De Morgan's theorem – verification

**UNIT-VI: PROFESSIONAL COMPONENTS:** expert lectures – seminars – webinars – industry inputs – social accountability – patriotism

### TEXT BOOKS

1. R.Murugesan (2001), Allied Physics, S. Chand and Co, New Delhi.
2. Brijlal and N.Subramanyam (1994), Waves and Oscillations, Vikas Publishing House, New Delhi.
3. Brijlal and N.Subramaniam (1994), Properties of Matter, S.Chand and Co., New Delhi.
4. J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8<sup>th</sup> edition), S.Chand and Co., New Delhi.
5. R.Murugesan (2005), Optics and Spectroscopy, S.Chand and Co, New Delhi.
6. A.Subramaniam, Applied Electronics 2<sup>nd</sup> Edn., National Publishing Co., Chennai.

### REFERENCE BOOKS

1. Resnick Halliday and Walker (2018). Fundamentals of Physics (11<sup>th</sup> edition), John Wiley and Sons, Asia Pvt.Ltd., Singapore.
2. V.R.Khanna and R.S.Bedi (1998), Textbook of Sound 1<sup>st</sup> Edn. Kedharnaath Publish and Co, Meerut.
3. N.S.Khare and S.S.Srivastava (1983), Electricity and Magnetism 10<sup>th</sup> Edn., Atma Ram and Sons, New Delhi.
4. D.R.Khanna and H.R. Gulati (1979). Optics, S. Chand and Co.Ltd., New Delhi.
5. V.K.Metha (2004). Principles of electronics 6<sup>th</sup> Edn. S.Chand and company.

### WEB RESOURCES

1. [https://youtu.be/M\\_5KYncYNyc](https://youtu.be/M_5KYncYNyc)
2. <https://youtu.be/ljJLJgIvaHY>
3. [https://youtu.be/7mGqd9HQ\\_AU](https://youtu.be/7mGqd9HQ_AU)
4. <https://youtu.be/h5jOAw57OXM>

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| GEC IV                                                                                                                                                                                                                                                   |                            | II YEAR- FOURTH SEMESTER |   |   |   |         |             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---|---|---|---------|-------------|
| Subject Code                                                                                                                                                                                                                                             | Subject Name               | Category                 | L | T | P | Credits | Inst. Hours |
|                                                                                                                                                                                                                                                          | ALLIED PHYSICS PRACTICAL I | GEC IV                   |   |   | 2 | 1       | 2           |
| <b>Learning Objectives:</b><br><br>Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results |                            |                          |   |   |   |         |             |

#### Minimum of Five Experiments from the list:

1. Young's modulus-non uniform bending –pin and microscope method.
2. Thermal conductivity of poor conductor using Lee's disc
3. Construction of AND, OR, NOT gates using diodes and transistor
4. NOR gate as a universal building block.
5. Characteristics of Zener diode.
6. Determination Refractive index of the material of the prism using spectrometer.
7. Thickness of a wire using air wedge
8. Interfacial surface tension-Drop weight method.

#### REFERENCE BOOKS:

3. C.C. Ouseph, U.J. Rao, V. Vijayendran, 2007, Practical Physics and Electronics, S. Viswanathan (Printers & Publishers), Pvt., Ltd,

#### METHOD OF EVALUATION:

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 40                             | 60                       | 100   |       |



VPL4E4

U23 PAGE 3

| GEC V                                                                                                                                                   |                         | II YEAR- FOURTH SEMESTER |   |   |   |         |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------|---|---|---|---------|-------------|
| Subject Code                                                                                                                                            | Subject Name            | Category                 | L | T | P | Credits | Inst. Hours |
|                                                                                                                                                         | ADVANCED ALLIED PHYSICS | GEC V                    | 4 |   |   | 4       | 4           |
| <b>COURSE OBJECTIVE:</b><br>To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics |                         |                          |   |   |   |         |             |

**UNIT-I OPTICS:** interference – interference in thin films – colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection.

**UNIT-II ATOMIC PHYSICS:** atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle – photo electric effect – Einstein's photoelectric equation – applications of photoelectric effect: solar cells.

**UNIT-III NUCLEAR PHYSICS:** nuclear models – liquid drop model – magic numbers – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life – radio isotopes and uses – controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – atom bomb – nuclear reactor – nuclear fusion – thermonuclear reactions – differences between fission and fusion.

**UNIT-IV INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES:** frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence.

**UNIT-V SEMICONDUCTOR PHYSICS:** p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment)

**UNIT-VI PROFESSIONAL COMPONENTS:** expert lectures – seminars – webinars – industry inputs – social accountability – patriotism

### TEXT BOOKS

1. V.K.Metha (2004), Principles of electronics, 6<sup>th</sup> Edn. ,S.Chand and Company, New Delhi R.Murugesan (2005), Allied Physics, S.Chand and Co, New Delhi.
2. K.Thangaraj and D.Jayaraman (2004), Allied Physics, Popular Book Depot, Chennai.
3. Brijlal and N.Subramanyam (2002), Text book of Optics, S.Chand and Co, New Delhi.
4. R.Murugesan (2005), Modern Physics, S.Chand and Co, New Delhi.

### REFERENCE BOOKS

1. D.R.Khanna and H.R. Gulati (1979). Optics, S.Chand and Co. Ltd., New Delhi.
2. A.Beiser (1997), Concepts of Modern Physics, Tata McGraw Hill Publication, New Delhi.
3. Thomas L. Floyd (2017), Digital Fundamentals, 11<sup>th</sup> Edn., Universal Book Stall, New Delhi.

UAPGE4

| GEC V        |                    | II YEAR- FOURTH SEMESTER |   |   |   |         |             |
|--------------|--------------------|--------------------------|---|---|---|---------|-------------|
| Subject Code | Subject Name       | Category                 | L | T | P | Credits | Inst. Hours |
|              | APPLIED PHYSICS II | GEC V                    | 4 |   |   | 4       | 4           |

UAPGE3  
U23APGE3**COURSE OBJECTIVE:**

- To expose the students towards different number system and their conversions.
- To identify the connection between electricity and magnetism.
- To make the student understand the characteristics and applications of FET and transistor.
- To understand how different devices can be integrated in an IC.
- To acquire the knowledge of operational amplifiers and its applications.

**UNIT I: NUMBER SYSTEMS, CODES**

Number systems- conversions – Binary addition, subtraction- multiplication- division- 8421 code – BCD code- Excess 3 code- Gray code- Binary to Gray and Gray to Binary conversion- ASCII code.

**UNIT II: TRANSISTORS**

PNP and NPN Transistors-DC characteristics of CE and CB configuration-Hybrid parameters-Only equation-Functions of transistors as an amplifier and oscillator-FET-Construction and Working-Characteristics of FET amplifier.

**UNIT III: OPERATIONAL AMPLIFIERS**

Basics of Op-amp-Inverting and Non-inverting Op-amp-Differential Op-amp-CMRR-Basic uses of Op-amp as sign and scale changer, phase shifter-Integrator-Differentiator-Adder-A/D conversion-Counter methods –Op-amp as a comparator.

**UNIT IV: DIGITAL LOGIC CIRCUITS**

Logic gates (AND, OR, NOT, XOR ONLY)-Boolean algebra-Demorgan's Theorem-Karnaugh map simplification-two variable-SOP-Encoder- Decimal to BCD encoder- Decoder- BCD to decimal decoder-Half Adder and Half Sub tractor –RS Flip flop.

**UNIT V: DIGITAL COMPONENTS**

Integrated circuits-Fabrication of diode and transistor-Decoders (Basic circuit 2 into 1) –Multiplexers (Basic circuit 4 into 1), Demultiplexer (basic 1 into 4)-Shift right and shift left registers.

**BOOKS FOR STUDY:**

1. The Fundamentals of Solid State Physics, Theraja, S. Chand and Co.
2. Digital Logic and Computer Design, Morris Mano, Pearson Education; (2004)

**BOOKS FOR REFERENCE:**

1. Digital Principles and Applications, Malvino & Leach, McGraw-Hill, 5th edition (1994).
2. Electronic Devices and Circuits-[Jacob Millman](#), [Christos C. Halkias](#), McGraw Hill Education (1967).

| GEC VI                                                                                                                                                                                                                                            |                                | II YEAR- FOURTH SEMESTER |   |   |   |         |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------|---|---|---|---------|------------|
| Subject Code                                                                                                                                                                                                                                      | SubjectName                    | Category                 | L | T | P | Credits | Inst.Hours |
|                                                                                                                                                                                                                                                   | APPLIED PHYSICS PRACTICE CL II | GEC VI                   | 2 |   |   | 1       | 2          |
| <b>Learning Objectives:</b> Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate result. |                                |                          |   |   |   |         |            |

#### LIST OF EXPERIMENTS (Any SIX Experiments)

1. Logic gates (AND, OR, NOT ,NAND AND EX-OR) using Ics
- NAND as universal gate.
- NOR as Universal gate.
- Verification of Demorgan,'s theorem.
- Half adder and half subtractor using logic gates.
- Mathematical operation- Addition, Subtraction using OP-amp.
- Multiplexer 4:1, Demultiplexer 1:4 using ICs.
- Simplification of Boolean expressions using K-Map
- Study of R-S Flip flop
- Study of Decimal to BCD encoder
- Study of BCD to decimal decoder

#### Books for Reference:

1. C.C. Ouseph,U.J.Rao, V.Vijayendran, 2007,Practical Physics and Electronics,S. Viswanathan (Printers &Publishers), Pvt.,Ltd,
2. B.Sc. Physics Practical Manual, Dept. of Physics, St. Joseph college(A), Trichy.

#### METHOD OF EVALUATION:

| Continuous InternalAssessment | End Semester Examination | Total | Grade |
|-------------------------------|--------------------------|-------|-------|
| 40                            | 60                       | 100   |       |

| GEC VI                                                                                                                                                                                                                                            |                             | II YEAR- FOURTH SEMESTER |   |   |   |         |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------|---|---|---|---------|-------------|
| Subject Code                                                                                                                                                                                                                                      | Subject Name                | Category                 | L | T | P | Credits | Inst. Hours |
|                                                                                                                                                                                                                                                   | ALLIED PHYSICS PRACTICAL II | GEC VI                   | 4 |   |   | 4       | 4           |
| <b>Learning Objectives:</b> Apply various Physics concepts; to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate result |                             |                          |   |   |   |         |             |

#### Minimum of Five Experiments from the list:

1. Construction of Zener regulated power supply.
2. Sonometer - Verification of laws.
3. Viscosity-Graduated burette method.
4. Newton's Law of Cooling-Specific heat capacity of a given liquid.
5. Refractive index of the material of the liquid prism using spectrometer.
6. Surface tension-Drop weight method
7. Determination of figure of merit table galvanometer
8. Junction diode characteristics.

#### Books for Reference:

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, 2007, Practical Physics and Electronics, S. Viswanathan (Printers & Publishers), Pvt., Ltd,
2. B.Sc. Physics Practical Manual, Dept. of Physics, St. Joseph college(A), Trichy.

#### METHOD OF EVALUATION:

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 40                             | 60                       | 100   |       |



| GEC III                                                                                                                                                                                                                                                                                                                                                                                  |                   | II YEAR- THIRD SEMESTER |   |   |   |         |             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------|---|---|---|---------|-------------|
| Subject Code                                                                                                                                                                                                                                                                                                                                                                             | Subject Name      | Category                | L | T | P | Credits | Inst. Hours |
| U23APGE1                                                                                                                                                                                                                                                                                                                                                                                 | APPLIED PHYSICS I | GEC III                 | 4 |   |   | 4       | 4           |
| <b>COURSE OBJECTIVE:</b> <ul style="list-style-type: none"> <li>To understand the mathematical expression for Gauss law and its application to real life situations.</li> <li>To identify the connection between electricity and magnetism.</li> <li>To introduce the basic laws involved in electrical circuits.</li> <li>To study the nature of various magnetic materials.</li> </ul> |                   |                         |   |   |   |         |             |

### UNIT I: ELECTROSTATICS

Gauss theorem and its applications-intensity due to charged sphere-capacitor-Principle of capacitor-Capacitors in series and parallel-Energy of a charged capacitor-Loss of energy due to the sharing of charges.

### UNIT II: MAGNETOSTATICS

Magnetic field-Magnetic flux density-Magnetization-Permeability-Susceptibility-Relation between them-Magnetic Potential-Properties of Dia, Para and Ferromagnetic Materials-Hysteresis-B-H Curve using Ballistic Galvanometer.

### UNIT III: CURRENT ELECTRICITY

Laplace's law-Magnetic field intensity at a point due to a straight conductor carrying current-Circular coil-Solenoid-Force between two parallel conductors- Ohms law- verification- Kirchhoff's law-

UAPGE3

Wheatstone's bridge-Carey Foster's bridge-Potentiometer-Calibration of low range voltmeter.

### UNIT IV: ELECTROMAGNETIC INDUCTION

Introduction-Laws of electromagnetic induction-Eddy currents & determination of self-inductance-Anderson's method- Mutual induction-Determination -Coefficient of coupling - Transformer theory.

### UNIT V: ALTERNATING CURRENT

AC circuits with double components-Measurements of current and voltage-Power in an AC circuit-Power factor derivation-Wattless current-Choke-Series and Parallel resonance circuits.-Oscillatory discharge of a condenser.

### BOOKS FOR STUDY

1. Electricity and Magnetism – Brijilal&Subramaniam, RatanPrakashanMandir, Agra, (1995).

2. Electricity and Magnetism- R.Murugesan, S.Chand& Company Pvt.Ltd.(2005)

3. Applied Physics –I- Sundaravelusamy.

### BOOKS FOR REFERENCE

1. Electricity and Magnetism- D.L.Seghal and Chopra, Sultan Chand and Sons, New Delhi.

2. Electricity and Magnetism – M.Narayanamurthi and N.Nagaratnam

### METHOD OF EVALUATION:

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 25                             | 75                       | 100   |       |

| GEC IV                                                                                                                                                                                                                                                                                      |                                | II YEAR- FOURTH SEMESTER |   |   |   |         |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------|---|---|---|---------|------------|
| Subject Code                                                                                                                                                                                                                                                                                | Subject Name                   | Category                 | L | T | P | Credits | Inst.Hours |
|                                                                                                                                                                                                                                                                                             | APPLIED PHYSICS<br>PRACTICAL I | GEC IV                   |   |   | 2 | 1       | 2          |
| <b>COURSE OBJECTIVE:</b> <ul style="list-style-type: none"> <li>To gain in depth of knowledge regarding the Physics fundamentals.</li> <li>To study the aspects related to the application side of experiments.</li> <li>To understand the utility of transistor, FET and OP-Amp</li> </ul> |                                |                          |   |   |   |         |            |

#### LIST OF EXPERIMENTS(Any SIX Experiments)

1. Semiconductor Diode-Characteristics
2. Zener diode-Characteristics
3. FET Characteristics
4. Transistor Characteristics in CE mode
5. Transistor Characteristics in CB mode
6. Zener controlled Regulated power Supply
7. Field along the axis of a coil-M and H
8. Verification of Ohm's law.
9. Potentiometer-Calibration of low range voltmeter.
10. Carey Foster's bridge-Specific resistance
11. Series resonance circuit

12. Parallel resonance circuit
13. Verification of Kirchhoff's laws.

#### BOOKS FOR REFERENCES:

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, 2007, Practical Physics and Electronics, S. Viswanathan (Printers & Publishers), Pvt., Ltd,
2. B.Sc. Physics Practical Manual, Dept. of Physics, St. Joseph college(A), Trichy.

#### METHOD OF EVALUATION:

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 40                             | 60                       | 100   |       |

**COURSE OUTCOMES:**

**At the end of the course, the student will be able to:**

|            |                                                                                        |
|------------|----------------------------------------------------------------------------------------|
| <b>CO1</b> | Develop the programming skills of Microprocessor                                       |
| <b>CO2</b> | Appreciate the applications of Microprocessor programming                              |
| <b>CO3</b> | Understand the structure and working of 8085 microprocessor and apply it.              |
| <b>CO4</b> | Acquire knowledge about the interfacing peripherals with 8085 microprocessor.          |
| <b>CO5</b> | Acquire knowledge about the interfacing 8051 microcontroller with various peripherals. |

**MAPPING WITH PROGRAM OUTCOMES:**

|            | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PO6</b> | <b>PO7</b> | <b>PO8</b> | <b>PO9</b> | <b>PO10</b> |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|
| <b>CO1</b> |            |            |            | ✓          | ✓          |            |            |            | ✓          |             |
| <b>CO2</b> |            |            | ✓          | ✓          | ✓          |            |            |            | ✓          |             |
| <b>CO3</b> | ✓          | ✓          |            | ✓          | ✓          |            |            |            | ✓          |             |
| <b>CO4</b> | ✓          | ✓          | ✓          | ✓          | ✓          |            |            |            | ✓          |             |
| <b>CO5</b> | ✓          | ✓          | ✓          | ✓          | ✓          |            |            |            | ✓          |             |

|            | <b>PSO1</b> | <b>PSO2</b> | <b>PSO3</b> | <b>PSO4</b> | <b>PSO5</b> | <b>PSO6</b> | <b>PSO7</b> | <b>PSO8</b> | <b>PSO9</b> | <b>PSO10</b> |
|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| <b>CO1</b> |             |             |             | ✓           | ✓           |             |             |             | ✓           |              |



|                          |                                                                                                                                                                                                                                                           |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COURSE</b>            | <b>FIFTH SEMESTER – CORE THEORY 3</b>                                                                                                                                                                                                                     |
| <b>COURSE TITLE</b>      | <b>ELECTRICITY AND MAGNETISM</b>                                                                                                                                                                                                                          |
| <b>CREDITS</b>           | <b>5</b> <b>Hours - 6</b>                                                                                                                                                                                                                                 |
| <b>COURSE OBJECTIVES</b> | To classify materials based on their electrical and magnetic properties. To analyse the working principles of electrical gadgets. To understand the behaviour of dc, ac and transient currents. To understand the communication by electromagnetic waves. |

### UNIT-I Electrostatics

Coulomb's law – Gauss's law and its application (Electric field due to a uniformly charged sphere, hollow cylinder and solid cylinder) – Electric potential – potential at a point due to a uniformly charged conducting sphere – principle of a capacitor – capacity of a spherical and cylindrical capacitors – energy stored in a charged capacitor – loss of energy on sharing of charges between two capacitors.

### UNIT-II Magnetic properties of materials

magnetic field – magnetic induction – intensity of magnetization – permeability – susceptibility – relation between them – properties of para, dia, and ferro magnetic materials – hysteresis – experiment to Draw B-H curve method.

### UNIT-III Current electricity:-

Biot-savart law – magnetic field intensity due to a straight conductor – circular coil and solenoid – force on current carrying conductor in a magnetic field – force between two parallel conductors – Theory of

Ballistic Galvanometer – figure of merit – Ampere's circuit law – Differential forms of ampere's law – magnetic field inside a long solenoid (application)

### UNIT-IV Electromagnetic Induction

Laws of electromagnetic induction – self induction – self inductance of solenoid – Rayleigh's method – Anderson's method – mutual induction – mutual inductance between two coaxial solenoids – Experimental determination of mutual inductance – coefficient of coupling – earth inductor – determination of angle of dip – Eddy currents.

### UNIT-V Transient and Alternating current

Growth of current in a circuit containing a resistance and inductance – decay of current in a circuit – containing L and R – discharge of capacitor through an inductor and resistor in series (decay of charge in LCR circuit)

Ac circuit containing R, L and C – series resonance circuit – parallel resonance circuit – power in an ac circuit containing R, L and C – power factor derivation – wattless circuit – choke.

**UNIT-VI PROFESSIONAL COMPONENTS:** expert lectures – seminars – webinars – industry inputs – social accountability – patriotism

### TEXT BOOKS

1. Murugesan. R., - Electricity and Magnetism, 8<sup>th</sup> Edn, 2000 S.Chand and Co, New Delhi.
2. Sehgal D.L., Chopra K.L, Sehgal N.K., - Electricity and Magnetism, Sultan Chand and Sons, New Delhi.
3. M. Narayanamurthy and N. Nagarathnam, Electricity and Magnetism, 4th Edition National Publishing Co., Meerut.

## REFERENCE BOOKS

1. Brijlal, N.Subramanyan and Jivan Seshan, Mechanics and Electrodynamics (2005), Eurasia Publishing House (Pvt.) Ltd., New Delhi.
2. David J. Griffiths, Introduction to Electrodynamics, 2<sup>nd</sup>Edn. 1997, Prentice Hall of India Pvt. Ltd., New Delhi
3. D. Halliday, R. Resnik and J. Walker - Fundamentals of Physics, 6<sup>th</sup>Edn., Wiley, NY, 2001.

## WEB

1. <https://www.edx.org/course/electricity>
2. <https://www.udemy.com/courses/electricity>
3. <https://www.edx.org/course/magnetism>
4. <http://www.hajim.rochester.edu/optics/undergraduate/courses.html>



**METHOD OF EVALUATION:**

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 25                             | 75                       | 100   |       |

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

|                            |            |                                                                                        |
|----------------------------|------------|----------------------------------------------------------------------------------------|
| <b>COURSEOUT<br/>COMES</b> | <b>CO1</b> | Describe various thermo-electric effects and their properties.                         |
|                            | <b>CO2</b> | Apply Biot and Savart law to study the magnetic effect of electric current.            |
|                            | <b>CO3</b> | Use Faraday and Lenz laws in explaining self and mutual inductance.                    |
|                            | <b>CO4</b> | Analyze the time variation of current and potential difference in AC circuits.         |
|                            | <b>CO5</b> | Relate different physical quantities used to explain magnetic properties of materials. |

**MAPPING WITH PROGRAM OUT COMES:**

Map course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PSO6 | PSO7 | PSO8 | PSO9 | PSO10 |
|-----|-----|-----|-----|-----|-----|------|------|------|------|-------|
| CO1 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    |      | ✓    | ✓    | ✓     |
| CO2 | ✓   | ✓   | ✓   |     | ✓   | ✓    | ✓    | ✓    | ✓    | ✓     |
| CO3 | ✓   |     | ✓   | ✓   | ✓   | ✓    |      | ✓    | ✓    | ✓     |
| CO4 | ✓   | ✓   | ✓   |     | ✓   | ✓    | ✓    | ✓    | ✓    | ✓     |
| CO5 |     | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    |      | ✓     |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| COURSE            | FIFTH SEMESTER - CORE                                                                                                                                                                                                                                                                                                                                                                                                                     |           |
| COURSE TITLE      | ATOMIC AND NUCLEAR PHYSICS                                                                                                                                                                                                                                                                                                                                                                                                                |           |
| CREDITS           | 5                                                                                                                                                                                                                                                                                                                                                                                                                                         | Hours : 5 |
| COURSE OBJECTIVES | To make students understand the development of atom models, quantum numbers, coupling schemes and analysis of magnetic moments of an electron; To gain knowledge on excitation and ionization potentials, splitting of spectral lines in magnetic and electric fields; To acquire knowledge on radioactive decay; To know the concepts used in nuclear reaction; to understand the quark model of classification of elementary particles. |           |

**UNIT-I VECTOR ATOM MODEL:** introduction to atom model – vector atom model – electron spin – spatial quantisation – quantum numbers associated with vector atom model – L-S and J-J coupling – Pauli's exclusion principle – magnetic dipole moment due to orbital motion and spin motion of the electron – Bohr magneton – Stern-Gerlach experiment – selection rules – intensity rule.

**UNIT-II ATOMIC SPECTRA:** origin of atomic spectra – excitation and ionization potentials – Davis and Goucher's method – spectral terms and notations – fine structure of sodium D-lines – Zeeman effect – Larmor's theorem – quantum mechanical explanation of normal Zeeman effect – anomalous Zeeman effect (qualitative explanation) – Paschen-Back effect – Stark effect.

**UNIT-III RADIOACTIVITY:** discovery of radioactivity – natural activity – properties of alpha rays, beta rays and gamma rays – Ge-Nuttall law – alpha particle spectra – ~~Gammow's theory of alpha~~ (qualitative study) – beta ray spectra – neutrino theory of beta decay – nuclear isomerism – internal conversion – non-conservation of parity – weak interactions.

**UNIT-IV NUCLEAR REACTIONS:** conservation laws of nuclear reaction – Q-value for a nuclear reaction – threshold energy – scattering cross section – artificial radio activity – application of radio isotopes – classification of neutrons.

**NUCLEAR MODEL:** models of nuclear structure – liquid drop model – Magic numbers – shell model.

**UNIT-V ELEMENTARY PARTICLES:** classification of elementary particles – fundamental interactions – elementary particle quantum numbers – isospin and strangeness quantum number – Conservation of angular momentum and symmetry – quarks – quark model (elementary ideas only) – discovery of cosmic rays – primary and secondary cosmic rays – latitude effect – altitude effect.

**UNIT-VI PROFESSIONAL COMPONENTS:** expert lectures – seminars – webinars – industry inputs – social accountability – patriotism

#### TEXT BOOKS

1. R. Murugesan, Modern Physics, S. Chand and Co. (All units) (Units I and II-Problems)
2. Brijlal and N. Subrahmanyam, Atomic and Nuclear Physics, S. Chand and Co. (All units)
3. J. B. Rajam, Modern Physics, S. Chand and Co.
4. Sehgal and Chopra, Modern Physics, Sultan Chand, New Delhi

5. Arthur Beiser– Concept of Modern Physics, McGraw Hill Publication, 6<sup>th</sup> Edition.
6. Modern Physics, S. Ramamoorthy, National Publishing and Co

#### METHOD OF EVALUATION:

#### REFERENCE BOOKS

1. Perspective of Modern Physics, Arthur Beiser, McGraw Hill.
2. Laser and Non-Linear Optics by B.B.Laud, Wiley Easter Ltd., New York, 1985.
3. Tayal, D.C. 2000 – Nuclear Physics, Edition, Himalaya Publishing House, Mumbai.
4. Irving Kaplan (1962) Nuclear Physics, Second Edition, Oxford and IBH Publish and Co, New Delhi.
5. Roy and Nigam, – Nuclear Physics (1967) First edition, Wiley Eastern Limited, New Delhi.

| Continuous Internal Assessment | End Semester Examination | Total |
|--------------------------------|--------------------------|-------|
| 25                             | 75                       | 100   |

#### WEB

1. <http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html>
2. <https://makingphysicsfun.files.wordpress.com/2015/01/photo-electric-effect.pptx>
3. <https://www.khanacademy.org/science/physics/quantum-physics/in-in-nuclei/v/types-of-decay>
4. <https://www.khanacademy.org/science/in-in-class-12th-physics-india/nuclei>



U23PC511P

|                          |                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>COURSE</b>            | <b>FIFTH SEMESTER – CORE PRACTICAL 5</b>                                                                                  |
| <b>COURSE TITLE</b>      | <b>GENERAL AND C-PROGRAMMING</b>                                                                                          |
| <b>CREDITS</b>           | <b>3 Hours - 3</b>                                                                                                        |
| <b>COURSE OBJECTIVES</b> | <b>Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results.</b> |

#### Minimum of Eight Experiments from the list:

1. Diffraction grating Normal incidence.
2. Diffraction grating minimum deviation
3. Dispersive power of plain diffraction grating
4. Spectrometer – Grating - Minimum deviation - Wave length of Mercury spectral lines.
5. Spectrometer – (i-d) curve.
6. Spectrometer – (i-i') curve.
7. Potentiometer –Resistance and specific resistance of the coil.
8. B.G – Figure of Merit – Charge Sensitivity
9. Spectrometer-cauchy's constant
10. Spectrometer-Small angled prism
11. Dispersive power of grating

12. Dispersive power of prism.
13. Determination of M & H using deflection vibration magnetometer.
14. To find the focal length of a convex lens by plotting graphs between U and V between  $1/U$  and  $1/V$ .

#### C-Programming

1. Solving quadratic equations
2. Finding the factorial of "N" numbers.
3. Finding the smallest/largest element in an array.
4. Sorting a set of numbers n ascending /descending order.
5. Addition /subtraction/ Multiplication of 2X2 matrix.

#### REFERENCE BOOKS

1. C.C. Ouseph, U.J.Rao, V.Vijagendran, 2007, practical physics and Electronics, S.Viswanathan (Printers& Publishers) part II (199)

|                          |                                                                                                                                                                                                                                                                                                                 |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COURSE</b>            | <b>FIFTH SEMESTER – DSE-I</b>                                                                                                                                                                                                                                                                                   |
| <b>COURSE TITLE</b>      | <b>COMPUTER PROGRAMMING –C LANGUAGE</b>                                                                                                                                                                                                                                                                         |
| <b>CREDITS</b>           | <b>3</b> <b>Hours - 4</b>                                                                                                                                                                                                                                                                                       |
| <b>COURSE OBJECTIVES</b> | <p><b>Learning Objective: To understand the basic concepts of C Programming.</b></p> <p><b>To understand the library functions and control statements, Study the Arrays and string functions, Understand the basics of pointers and Write down the source codes in C for solving mathematical problems.</b></p> |

#### **UNIT-I DATA TYPES, OPERATORS AND EXPRESSIONS :**

History of C– Basic structure of C Programs – Character set – Keywords and identifiers – Constants – Variables – Data types – Declaration of variables – Assigning values to variables. Operators – Classification – Arithmetic expression and its evaluation – Precedence and Associativity of operators.

#### **UNIT-II I/O , CONTROL STATEMENTS AND ARRAYS:**

Library functions- gets, puts, getchar, putchar functions – Formatted input (scanf) and Formatted output (printf)-Decision making with if-simple if-if ...else-nested if ...else .The Else if ladder-switch-goto-break-continue-while-do ....while- for statements. Arrays-One dimensional arrays – Declaration of one dimensional arrays- Initialization of one dimensional arrays – Two dimensional arrays – Declaration of two dimensional arrays- Initialization of Two dimensional arrays- Multidimensional arrays – Character strings – Initialization-String handling function.

**UNIT-III FUNCTION AND STRUCTURE:** Function-Function definition- Return statement- Function call- Function declaration- Types of functions-Local and Global variables-Recursion-Storage class. Structures- Declaring structure variables-Accessing structure member – structure initialization.

#### **UNIT-IV POINTERS, FILES AND PREPROCESSORS :**

Pointers- The address operator (&)- The indirection operator(\*)- Initialization of pointer variables- Pointer arithmetic- Pointers and functions. Files in C-File declaration – Opening and closing a file- Accessing a file – Character, Integer and String oriented I/O functions.

**UNIT-V PROGRAMS :** Development of algorithm, flowchart and program for the following problems:

1. Solving Quadratic Equations
2. Find the Factorial of N numbers.
3. Find the smallest/largest element in an array
4. Sorting a set of numbers in ascending/descending order.
5. Addition/Subtraction/Multiplication of two matrices

## UNIT VI: (NOT FOR EXAMINATIONS)

Introduction to C-pointers-functions.

[https://youtu.be/iT\\_553vTyZl](https://youtu.be/iT_553vTyZl)

<https://youtu.be/pzdnFwwYjt8>

<https://youtu.be/CPG3oATGls>

<https://youtu.be/ZN3MrwUxPA>

### TEXT BOOKS

1. Programming in ANSI C - E. Balagurusamy. Tata McGraw Hill, New Delhi,(1999).
1. Schaum's outline series theory and problems of programming with C- Byron S.Gottrified. McGraw Hill Internationals, (1996).
2. Programming with C - Venugopal K.P & Sudep R.P., Tata McGraw Hill, NewDelhi,(1998).
3. Programming in C – Siymala Krishanan.

### REFERENCE BOOKS

1. Pointers in C - Yashavant P. Kanetkar, BPB Publication



|                                 |            |                                                                                                           |
|---------------------------------|------------|-----------------------------------------------------------------------------------------------------------|
| <b>COURSE<br/>OUT<br/>COMES</b> | <b>CO1</b> | Explain the basic structure and syntax of C programming including variables, data types, and operators    |
|                                 | <b>CO2</b> | Apply decision-making and looping constructs to develop structured programs using control statements      |
|                                 | <b>CO3</b> | Design and implement programs using arrays and strings for data manipulation and processing               |
|                                 | <b>CO4</b> | Develop modular programs using functions, recursion, and structures for code reusability and organization |
|                                 | <b>CO5</b> | Demonstrate the use of pointers and file handling techniques for memory management and data storage in C  |

Map course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

|            | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PSO6</b> | <b>PSO7</b> | <b>PSO8</b> | <b>PSO9</b> | <b>PSO10</b> |
|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|--------------|
| <b>CO1</b> | ✓          | ✓          | ✓          | ✓          |            | ✓           | ✓           | ✓           | ✓           |              |
| <b>CO2</b> | ✓          | ✓          | ✓          | ✓          |            | ✓           | ✓           | ✓           | ✓           |              |
| <b>CO3</b> | ✓          | ✓          | ✓          | ✓          |            | ✓           | ✓           | ✓           | ✓           |              |
| <b>CO4</b> | ✓          | ✓          | ✓          |            |            | ✓           | ✓           |             |             |              |
| <b>CO5</b> |            |            |            | ✓          |            |             |             | ✓           |             |              |

U23PGES:4

|                          |                                                                                                                                                     |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COURSE</b>            | <b>FIFTH SEMESTER – CORE</b>                                                                                                                        |
| <b>COURSE TITLE</b>      | <b>ANALOG ELECTRONICS</b>                                                                                                                           |
| <b>CREDITS</b>           | <b>3</b> <b>Hours - 4</b>                                                                                                                           |
| <b>COURSE OBJECTIVES</b> | <b>To study the design, working and applications of semiconducting devices. To construct various electronic circuits. To study them in details.</b> |

**UNIT-I DIODES: Junction diode:** diode characteristics – rectifiers - clipper circuits, clamping circuits - half wave rectifier- bridge full wave rectifiers, calculation of efficiency and ripple factor - Characteristics of zener diode - Zener diode as voltage regulator.

**UNIT-II TRANSISTOR:** transistor working - transistor biasing- voltage divider method- configuration of a transistor CB and CE characteristics of a transistor- relation between  $\alpha$  and  $\beta$  – DC load line - hybrid parameters-two port network-determination of h-parameters.

**UNIT-III TRANSISTOR AMPLIFIERS:** Transistor as an amplifier – Q point self-bias – RC coupled CE amplifier –power amplifiers – classification of power amplifiers: A, B, C – push pull amplifiers

**UNIT-IV transistor Oscillators:** Barkhausen's criterion - Transistor oscillators: Hartely, Colpitt, - calculation of frequency of oscillations mutivibrator - astable and monostable.

**UNIT-V OPERATIONAL AMPLIFIERS:** Ideal OP-AMP characteristics –IC 741 pin configuration – inverting and non-inverting amplifiers –unity follower –summing and difference amplifier differentiator and integrator – solving differential equation second order only

**UNIT-V OPERATIONAL AMPLIFIERS:** Ideal OP-AMP characteristics –IC 741 pin configuration – inverting and non-inverting amplifiers – unity follower –summing and difference amplifiers – differentiator and integrator – solving differential equation –second order only.

**UNIT-VI PROFESSIONAL COMPONENTS:** expert lectures seminars — webinars – industry inputs – social accountability patriotism

#### TEXT BOOKS

1. V.K.Mehta - Principles of Electronics, S.Chand and Co. Ltd 2004.
2. V.Vijayendran - Integrated Electronics, S.Vishwanatha Publishers, Chennai.
3. B.L. Theraja – Basic Electronics – S. Chand & co. Ltd, 2000.
4. P.Arun – Electronics – Narosa publishing House, 2011.
5. Malvino - Electronic Principles, Tata McGraw Hil

### REFERENCE BOOKS

1. B. Grob - Basic Electronics, 6<sup>th</sup> edition, McGraw Hill, NY, 1989.
2. Herbert Taub and Donald schilling - Digital Integrated Electronics, McGraw Hill, NY.
3. Ramakant A. – Op amp principles and linear integrated circuits, Gaykward
4. Bagde and S. P. Singh - Elements of Electronics.
5. Millman and Halkias- Integrated Electronics, Tata McGraw Hill.
6. John D. Ryder - Electronic fundamentals and Applications.

### WEB RESOURCES

1. <https://www.queenmaryscollege.edu.in/eresources/undergraduateprogram/py157>
2. [www.ocw.mit.edu](http://www.ocw.mit.edu)>...> Circuits and Electronics
3. [www.ocw.mit.edu](http://www.ocw.mit.edu)>...> Introductory Analog Electronics Laboratory
4. [https:// www.elprocus.com](https://www.elprocus.com)> semiconductor devices
5. [https:// www.britannica.com](https://www.britannica.com)>technology



**METHOD OF EVALUATION:**

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 25                             | 75                       | 100   |       |

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

|                            |            |                                                                                                    |
|----------------------------|------------|----------------------------------------------------------------------------------------------------|
| <b>COURSEOUT<br/>COMES</b> | <b>CO1</b> | Explain the basic concepts of semiconductors devices.                                              |
|                            | <b>CO2</b> | Understand and classify the basic principles of biasing and transistor amplifiers                  |
|                            | <b>CO3</b> | Learn and analyze the operations of sequential and combinational digital circuits                  |
|                            | <b>CO4</b> | Understand the fundamental concepts of oscillators.                                                |
|                            | <b>CO5</b> | Understand the working of operational amplifiers and applications to designing an analog computer. |

**MAPPING WITH PROGRAM OUT COMES:**

Map course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PSO6 | PSO7 | PSO8 | PSO9 | PSO10 |
|-----|-----|-----|-----|-----|-----|------|------|------|------|-------|
| CO1 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    |      | ✓    | ✓     |
| CO2 | ✓   | ✓   | ✓   | ✓   |     | ✓    | ✓    | ✓    | ✓    | ✓     |
| CO3 | ✓   | ✓   |     | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓     |
| CO4 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    |      | ✓    | ✓    |       |
| CO5 |     | ✓   | ✓   | ✓   | ✓   |      | ✓    | ✓    | ✓    | ✓     |

U23P5 NT

|                          |                                                                                                                                                                                       |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COURSE TITLE</b>      | <b>2. NON DESTRUCTIVE TESTING</b>                                                                                                                                                     |
| <b>COURSE OBJECTIVES</b> | 1. Principles of various NDT techniques.<br>2. The equipment required for the NDT.<br>3. The procedure followed in NDT techniques.<br>4. Applications of NDT and recent trends in NDT |

**UNIT-I OVERVIEW OF NDT:** Introduction of materials testing - classification of material test - Overview of the Non-Destructive testing methods - various NDT methods- visual inspection.

**UNIT-II SURFACE NDE METHODS:** Liquid Penetrant Testing - Principles - types and properties of liquid penetrants. Penetrant testing methods - Interpretation of results - Applications.

**UNIT-III THERMOGRAPHY:** Thermography- Principles, Contact and non contact inspection methods, Techniques for applying liquid crystals, Advantages and limitations.

**UNIT-IV ULTRASONIC TESTING (UT)** Ultrasonic and acoustic emission testing - Basics of ultrasonic waves - principle - Ultrasonic testing methods - ultrasonic transducers - model of display - Applications.

**UNIT-V RADIOGRAPHY (RT)** Radiography - Principle equipment of Radiography testing - Film and Filmless techniques - types and use of filters and screens.

### TEXT BOOKS

1. American Metals Society, "Non-Destructive Examination and Quality Control", Metals Hand Book, Vol.17, 9th Ed, Metals Park, OH, 1989.
2. Bray, Don.E and Stanley, Roderic.K, "Nondestructive Evaluation: A Tool in Design, Manufacturing, and Service. Revised", CRC Press New York, Edition 1997.
3. [www.ndt-ed.org](http://www.ndt-ed.org)
4. [www.krautkramer.com.au](http://www.krautkramer.com.au)

### REFERENCE BOOKS

1. J Prasad, C G K Nair, "Non-Destructive Testing and Evaluation of Materials", Tata McGraw Hill Education Private Limited

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

|                        |            |                                                                                                                 |
|------------------------|------------|-----------------------------------------------------------------------------------------------------------------|
| <b>COURSE OUTCOMES</b> | <b>CO1</b> | Understand the principles and classification of various Non-Destructive Testing (NDT) methods.                  |
|                        | <b>CO2</b> | Apply Liquid Penetrant Testing (LPT) and other surface NDE methods for defect detection.                        |
|                        | <b>CO3</b> | Utilize thermography principles and techniques for non-contact inspection.                                      |
|                        | <b>CO4</b> | Conduct Ultrasonic Testing (UT) and Acoustic Emission Testing for defect detection.                             |
|                        | <b>CO5</b> | Apply Radiography (RT) principles and techniques for internal defect detection using film and filmless methods. |

**MAPPING WITH PROGRAM OUT COMES:**

Map course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PSO6 | PSO7 | PSO8 | PSO9 | PSO10 |
|-----|-----|-----|-----|-----|-----|------|------|------|------|-------|
| CO1 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    |      | ✓    | ✓     |
| CO2 | ✓   | ✓   | ✓   | ✓   |     | ✓    | ✓    | ✓    | ✓    | ✓     |
| CO3 | ✓   | ✓   |     | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓     |
| CO4 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    |      | ✓    | ✓    |       |
| CO5 |     | ✓   | ✓   | ✓   | ✓   |      | ✓    | ✓    | ✓    | ✓     |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| COURSE            | SIXTH SEMESTER – CORE                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| COURSE TITLE      | QUANTUM MECHANICS AND RELATIVITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| CREDITS           | 5 <span style="float: right;">Hours - 5</span>                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| COURSE OBJECTIVES | To understand the theory of relativity, its postulates and the consequences. To learn the importance of transformation equations and also to differentiate between special and general theory of relativity. To interpret the wave theory of matter with various theoretical and experimental evidences. To derive and use Schrodinger's wave equation and also learn about various operators. To solve Schrodinger's wave equation for simple problems and analyse to understand the solutions. |

**UNIT-I SPECIAL THEORY OF RELATIVITY:** Michelson-Morley experiment—frames of reference – Galilean Relativity – postulates of special theory of relativity – Lorentz transformation – consequences – time dilation—concept of simultaneity – Doppler effect – length contraction—variation of mass with velocity – Einstein's mass-energy relation— relativistic momentum – energy relation.

**UNIT-II TRANSFORMATION RELATIONS:** transformation of velocity, mass, energy and momentum – Minkowski's space-four vector – invariance under transformation

**GENERAL THEORY OF RELATIVITY:** Inertial and Gravitational mass – Principle of equivalence – Experimental evidences for General theory of Relativity.

**UNIT-III PHOTONS AND MATTER WAVES:** difficulties of classical physics and origin of quantum theory – black body radiation – Planck's law – Einstein's photoelectric equation – Compton effect – pair production – De Broglie waves – phase velocity and group velocity – Davisson and Germer's experiment – uncertainty principle – consequences – illustration of Gamma ray microscope.

**UNIT-IV OPERATORS AND SCHRÖDINGER EQUATION:** postulates of quantum mechanics – Wave function and its interpretation – Schrödinger's equation – linear operators – Eigenvalue – Hermitian operator – properties of Hermitian operator— observable – operators for position, linear Momentum, angular momentum components –commutator algebra –commutator between these operators –expectation values of position and momentum

**UNIT-V SOLVING SCHRÖDINGER EQUATION FOR SIMPLE PROBLEMS:** *one-dimensional problems:* (i) particle in a box, (ii) barrier penetration problem – quantum mechanical tunneling, (iii) linear harmonic oscillator.

**UNIT-VI PROFESSIONAL COMPONENTS:** expert lectures – seminars – webinars – industry inputs – social accountability – patriotism

### TEXT BOOKS

1. Modern Physics, R. Murugesan, KiruthigaSivaprasath,S. Chand and Co.,17th Revised Edition, 2014.
2. Concepts of Modern Physics, A.Beiser, 6th Ed., McGraw-Hill, 2003.
3. *Special Theory of Relativity*,S.P.Puri, Pearson Education, India, 2013.
4. Aruldas .G Quantum mechanics,PHI Learning PVT-Ltd,New Delhi 2009.
5. Fundamentals of Special and General Relativity, Krori, K.D,PHI Learning pvt ltd.
6. Quantum mechanics – Satyaprakash and Swati Saluja. KedarNath Ram Nathand Co.

### REFERENCE BOOKS

1. Fundamentals of Modern Physics, Peter J. Nolan, 1stEdition, 2014, by Physics
2. Quantum Mechanics, V. Devanathan, Narosa Pub. House, Chennai, 2005.
3. Quantum Mechanics, V.K. Thangappan, New Age International, New Delhi.
4. A Text Book of Quantum Mechanics, Mathews and Venkatesan, Tata McGraw Hill, New Delhi.
5. Introduction to Quantum Mechanics, Pauling and Wilson, McQuantum Mechanics,
6. Ghatakand Loganathan, Macmillan Publications. Graw Hill Co., NewYork.

### WEB RESOURCES

1. <http://hyperphysics.phy-astr.gsu.edu/hbase/qapp.html>
2. [https://swayam.gov.in/nd2\\_arpl9\\_ap83/preview](https://swayam.gov.in/nd2_arpl9_ap83/preview)
3. [https://swayam.gov.in/nd1\\_noc20\\_ph05/preview](https://swayam.gov.in/nd1_noc20_ph05/preview)
4. <https://www.khanacademy.org/science/physics/special-relativity/minkowski-spacetime/v/introduction-to-special-relativity-and-minkowski-spacetime-diagrams>

### METHOD OF EVALUATION:

| Continuous Internal Assessment | End Semester Examination | Total |
|--------------------------------|--------------------------|-------|
| 25                             | 75                       | 100   |



**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

|                            |            |                                                                                                  |
|----------------------------|------------|--------------------------------------------------------------------------------------------------|
| <b>COURSEOUT<br/>COMES</b> | <b>CO1</b> | Understand various postulates of special theory of relativity.                                   |
|                            | <b>CO2</b> | Appreciate the importance of transformation equations and also the general theory of relativity. |
|                            | <b>CO3</b> | Realise the wave nature of matter and understand its importance                                  |
|                            | <b>CO4</b> | Derive Schrodinger equation and also realize the use of operators.                               |
|                            | <b>CO5</b> | Apply Schrödinger equation to simple problems.                                                   |

**MAPPING WITH PROGRAM OUT COMES:**

Map course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PSO6 | PSO7 | PSO8 | PSO9 | PSO10 |
|-----|-----|-----|-----|-----|-----|------|------|------|------|-------|
| CO1 | ✓   | ✓   | ✓   | ✓   | ✓   |      | ✓    | ✓    | ✓    | ✓     |
| CO2 |     | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    |      | ✓     |
| CO3 | ✓   | ✓   | ✓   |     | ✓   | ✓    | ✓    |      | ✓    | ✓     |
| CO4 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    |      | ✓    | ✓    | ✓     |
| CO5 | ✓   |     | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓     |

U23PC614

|                          |                                                                                                                                                                                                                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COURSE</b>            | <b>SIXTH SEMESTER – Course IV</b>                                                                                                                                                                                                                                                       |
| <b>COURSE TITLE</b>      | <b>SOLID STATE PHYSICS</b>                                                                                                                                                                                                                                                              |
| <b>CREDITS</b>           | <b>5</b>                                                                                                                                                                                                                                                                                |
|                          | <b>Hours - 5</b>                                                                                                                                                                                                                                                                        |
| <b>COURSE OBJECTIVES</b> | <p>Develop a foundational understanding of crystal structures, bonding, and lattice dynamics.</p> <p>Analyze the electronic properties of solids using quantum mechanics and band theory.</p> <p>Understand the electrical, thermal, magnetic, and optical properties of materials.</p> |

**UNIT-I CRYSTAL STRUCTURE** Crystal lattice – lattice translational vectors – lattice with basis – unit cell – Bravais' lattices – Miller indices – procedure for finding them – SC, BCC and FCC structures – structures of NaCl and diamond crystals – Brillouin zones – X-rays – Bragg's law (simple problems) – experimental methods: Laue method, powder method and rotating crystal method.

**UNIT-II FREE ELECTRON THEORY AND SPECIFIC HEAT CAPACITY:** Dulong and Petit's Law – Einstein and Debye theories of specific heat of solids –  $T^3$  law (qualitative only) – properties of metals – classical free electron theory of metals (Drude-Lorentz) – Ohm's law – electrical and thermal conductivities – Weidemann-Franz' law – Sommerfeld's quantum free electron theory (qualitative only) – Einstein's theory of specific heat capacity.

**UNIT-III MAGNETIC PROPERTIES OF SOLIDS:** Permeability, susceptibility, relation between them – classification of magnetic materials – properties of dia, para, ferro, ferri and anti ferromagnetism – Langevin's theory of diamagnetism – Langevin's theory of paramagnetism – Curie-Weiss law – Weiss theory of ferromagnetism (qualitative only) – domains – discussion of B-H curve – hysteresis and energy loss – soft and hard magnets.

**UNIT-IV DIELECTRIC PROPERTIES OF MATERIALS:** polarization and electric susceptibility – local electric field of an atom – dielectric constant and polarisability – polarization processes: electronic polarization – calculation of polarisability – ionic, orientational, electronic and space charge polarization – internal field – Clausius-Mosotti relation – frequency dependence of dielectric constant – dielectric loss – effect of temperature on orientation polarisation.

**UNIT-V FERROELECTRIC AND SUPERCONDUCTING MATERIALS:**

**Ferroelectric effect:** Curie-Weiss Law – ferroelectric domains, P-E hysteresis loop – **elementary band theory:** Hall effect – measurement of conductivity (four probe method) – Hall coefficient. **Superconductivity:** critical temperature – critical magnetic field – Meissner effect – type-I and type-II superconductors – London's equation and penetration depth – isotope effect – Cooper pair – idea of BCS theory (no derivation)

**UNIT-VI PROFESSIONAL COMPONENTS:** expert lectures  
–seminars — webinars – industry inputs – social accountability –  
patriotism

### TEXT BOOKS

1. Raghavan - Materials science and Engineering, PHI
2. Azaroff - Introduction to solids, TMH
3. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India
4. Solid State Physics , R L Singhal, Kedarnath Ram Nathand Co., Meerut (2003)
5. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India
6. Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning
7. Solid-state Physics, H. Ibach and H. Luth, 2009, Springer
8. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India
9. Solid State Physics, M.A. Wahab, 2011, Narosa Publishing House, ND
10. Solid State Physics., Gupta Kumar, K.Nath&co., Meerut.

### REFERENCE BOOKS

1. Puriand Babber – Solid State Physics – S.Chandand Co. New Delhi.
2. S. O. Pillai - Solid State Physics, Narosa publication
3. A.J. Dekker - Solid State Physics, McMillan India Ltd.
4. Introduction to Solid State Physics, Kittel, Willey Eastern Ltd (2003).
5. Solid state Physics, Rita John, 1st edition, Tata Mc Graw Hill publishers (2014).
6. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill

### WEB

1. <https://nptel.ac.in/courses/115105099/>
2. <https://nptel.ac.in/courses/115106061/>



**METHOD OF EVALUATION:**

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 25                             | 75                       | 100   |       |

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

|                            |            |                                                                                                                  |
|----------------------------|------------|------------------------------------------------------------------------------------------------------------------|
| <b>COURSEOUT<br/>COMES</b> | <b>CO1</b> | Classify the bonding and crystal structure using X ray diffraction.                                              |
|                            | <b>CO2</b> | Understand the lattice dynamics and thus learn the electrical and thermal properties of materials.               |
|                            | <b>CO3</b> | Classify magnetic materials on the basis of their behaviour.                                                     |
|                            | <b>CO4</b> | Comprehend the dielectric behavior of materials.                                                                 |
|                            | <b>CO5</b> | Understand the ferroelectric and super conducting properties of materials in an attempt for further application. |

**MAPPING WITH PROGRAM OUT COMES:**

Map course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| CO1 |     | ✓   | ✓   | ✓   | ✓   |     | ✓   | ✓   | ✓   | ✓    |
| CO2 | ✓   | ✓   |     | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    |
| CO3 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     | ✓   | ✓    |
| CO4 | ✓   | ✓   | ✓   | ✓   | ✓   |     | ✓   | ✓   | ✓   | ✓    |
| CO5 | ✓   |     | ✓   | ✓   | ✓   | ✓   |     | ✓   | ✓   | ✓    |

U23PC65P

|                          |                                                                                                                                                                                                                                                                                            |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COURSE</b>            | <b>SIXTH SEMESTER – CC-XVI</b>                                                                                                                                                                                                                                                             |
| <b>COURSE TITLE</b>      | <b>ELECTRONICS AND MICROPROCESSOR<br/>-8085 PRACTICAL VI</b>                                                                                                                                                                                                                               |
| <b>CREDITS</b>           | <b>3</b>                                                                                                                                                                                                                                                                                   |
| <b>COURSE OBJECTIVES</b> | <b>Hours – 6</b><br>To perform basic experiments on characteristics of electronic devices and then get into the applications such as amplifiers, oscillators, counters, multi vibrators. Perform fundamental experiments on microprocessor 8085 and learn to write programs by themselves. |

15. Microprocessor 8085 – division (8 bit only)
16. Microprocessor 8085 – largest/smallest of numbers (8 bit only)
17. Microprocessor 8085 – ascending/descending order
18. Microprocessor 8085 – Fibonacci series

**Minimum of Ten Experiments from the list:**

1. Zener diode – voltage regulations
2. Characteristics of a transistor – (CE mode)
3. Characteristics of a transistor – (CB mode).
4. RC coupled CE transistor amplifier - single stage.
5. AC circuits with L,C,R -Series resonance.
6. AC circuits with L,C,R - Parallel resonance.
7. Study of gate ICs – NOT, OR, AND, NOR, NAND, XOR, XNOR
8. Verification of De Morgan's theorem using ICs –NOT, OR, AND
9. NAND as universal building block.
10. NOR as universal building block.
11. Half adder / Half subtractor using basic logic gate ICs
12. Microprocessor 8085 – addition (8 bit only)
13. Microprocessor 8085 – subtraction (8 bit only)
14. Microprocessor 8085 – multiplication (8 bit only)

**REFERENCE BOOKS**

1. C.C. Ouseph, U.J.Rao, V.Vijayendran, 2007, Practical Physics and Electronics, S.Viswanathan (Printers &Publishers), Pvt., Ltd,

|                          |                                                                                                                                                                                                                                                                      |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COURSE</b>            | <b>SIXTH SEMESTER – DISCIPLINE SPECIFIC ELECTIVE</b>                                                                                                                                                                                                                 |
| <b>COURSE TITLE</b>      | <b>DIGITAL ELECTRONICS AND MICROPROCESSOR 8085</b>                                                                                                                                                                                                                   |
| <b>CREDITS</b>           | <b>4</b> <span style="float: right;"><b>Hours - 5</b></span>                                                                                                                                                                                                         |
| <b>COURSE OBJECTIVES</b> | To understand different types of number systems, Boolean algebra and identities, digital circuits for addition and subtraction, flip-flops, registers, counters. To acquire the knowledge on fundamentals of 8085 architecture, instruction sets and simple programs |

**UNIT-I NUMBER SYSTEMS AND BINARY LOGIC:** Decimal, binary, octal, hexadecimal numbers systems and their conversions – codes: BCD, gray and excess-3 codes – code conversions – binary addition, binary subtraction using 1's and 2's complement methods – Boolean laws – De-Morgan's theorem – Basic logic gates - universal logic gates (NAND and NOR) – standard representation of logic functions (SOP) – minimization techniques - Karnaughmap: 2, 3, 4 variables.

**UNIT-II COMBINATIONAL AND SEQUENTIAL LOGIC:** Half and full adder – Half and full subtractor – parallel binary adder – multiplexers (4:1) and demultiplexers (1:4), encoder (8-line-to-3-line) and decoder (3-line-to-8-line), BCD to seven segment decoder - S-R Flip-flop, J-K Flip-flop.

**UNIT-III COUNTERS AND SEMICONDUCTOR MEMORIES:** Counters - 4-bit asynchronous: synchronous - and ring counter – general memory operations, ROM, RAM (static and dynamic), PROM, EPROM, – logic families: RTL, DTL, TTL logic gates.

**UNIT-IV 8085 MICROPROCESSOR:** Introduction to microprocessor – INTEL 8085 architecture – register organization – pin configuration of 8085, interrupts and its priority – Program Status Word (PSW) – instruction set of 8085 – addressing modes of 8085.

**UNIT-V I/O INTERFACES:** serial communication interface (8251-USART) – programmable peripheral interface (8255-PPI) – keyboard and display (8279), DMA controller (8237).

**UNIT-VI PROFESSIONAL COMPONENTS:** expert lectures – seminars – webinars – industry inputs – social accountability – patriotism

#### TEXT BOOKS

1. M.Morris Mano, "Digital Design "3rd Edition, PHI, NewDelhi.
2. S.Salivahana and S. Arivazhagan-Digital circuits and design
3. Microprocessor Architecture, Programming and Applications with the 8085 – Penram International Publishing, Mumbai.- Ramesh S.Gaonakar
4. Microcomputer Systems the 8086/8088 family – YU-Cheng Liu and GlenSA
5. Modern Digital Electronics by R.P. Jain
6. Introduction to Integrated Electronics: Digital and Analog by V. Vijayendran
7. Microprocessor 8085 and Its Interfacing" by Sunil Mathur,
8. 8085 Microprocessor: Programming and Interfacing" by N.K. Srinath.

#### REFERENCE BOOKS

1. Herbert Taub and Donald Schilling. "Digital Integrated Electronics". McGraw Hill. 1985.

2. S.K. Bose. "Digital Systems". 2/e. New Age International.1992.
3. D.K. Anvekar and B.S. Sonade. "Electronic Data Converters: Fundamentals and Applications". TMH.1994.
4. Malvino and Leach. "Digital Principles and Applications". TMG Hill Edition
5. Microprocessors and Interfacing – Douglas V.Hall
6. Microprocessor and Interfacing: 8, 16, 32, 64-bit Intel Processors by Dr D A Godse , A P Godse
7. Ronald J. Tocci. "Digital Systems-Principles and Applications" 6/e. PHI. New Delhi. 1999.(UNITS I to IV )

#### WEB

1. <https://youtu.be/-paFaxtTckI>
2. <https://youtu.be/s1DSZEaCXg>

#### METHOD OF EVALUATION:

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 25                             | 75                       | 100   |       |



|                          |                                                                                                                                                                |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COURSE</b>            | <b>SIXTH SEMESTER – SEC</b>                                                                                                                                    |
| <b>COURSE TITLE</b>      | <b>ENTERTAINMENT ELECTRONICS</b>                                                                                                                               |
| <b>CREDITS</b>           | 2                                                                                                                                                              |
| <b>COURSE OBJECTIVES</b> | Hours - 2<br>To impart knowledge on basic electronic devices used for media and entertainment. Also to make them learn its construction and working in detail. |

5. s", Mc-Graw-Hill Inc., U.S.A, 2nd edition, 1993.

**UNIT-I** Television, tape recorder and loud speaker, public address system, basic theory and working

**UNIT-II** Introduction to DVD, Cameras-film and digital camera

**UNIT-III** Basic theory of VCD and Computer

**UNIT-IV** i-pod, i-phone, cell phone and laptop

**UNIT-V** Introduction to Internet-film and video projector-DTH

#### **TEXT BOOKS**

1. "Television Engineering" by R.R. Gulati
2. "Fundamentals of Photography" by Tom Ang
3. "The Secret Guide to Computers" by Russ Walter
4. "Digital Photography Complete Course" by David Taylor
5. "Cinematography: Theory and Practice" by Blain Brown

U23PGE 6:4

|                   |                                                                                                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| COURSE            | SIXTH SEMESTER – DSE-3                                                                                                                                                                                                            |
| COURSE TITLE      | MATERIALS SCIENCE                                                                                                                                                                                                                 |
| CREDITS           | 3                                                                                                                                                                                                                                 |
|                   | Hours - 4                                                                                                                                                                                                                         |
| COURSE OBJECTIVES | To learn imperfections in crystals, deformation of materials and testing of materials. To get knowledge on behavior of a material, under the action of light and their applications. To know the applications of crystal defects. |

**UNIT-I CRYSTAL IMPERFECTIONS:** introduction – point defects: vacancies(*problems*), interstitials, impurities, electronic defects – equilibrium concentration of point imperfections (*problems*) – application of point defects – line defects: edge dislocation(*problems*), screw dislocation – surface defects: extrinsic defects – intrinsic defects: grain boundaries, colour centre.

**UNIT-II MATERIAL DEFORMATION:** introduction – elastic behavior of materials – atomic model of elastic behavior – modulus as a parameter in design – rubber like elasticity – inelastic behavior of materials – relaxation process – viscoelastic behavior of materials – spring-Dash pot models of visco behavior of materials.

**UNIT-III PERMANENT DEFORMATION AND STRENGTHENING METHODS OF MATERIALS:** introduction – plastic deformation: tensile stress-strain curve – plastic deformation by slip – creep: mechanism of creep – creep resistant materials – strengthening methods: strain hardening, grain refinement – solid solution strengthening – precipitation strengthening.

**UNIT-IV OPTICAL MATERIALS:** introduction – optical absorption in metals, semiconductors and insulators – NLO materials and their applications – display devices and display materials: fluorescence and phosphorescence – light emitting diodes – liquid crystal displays.

**UNIT-V MECHANICAL TESTING:** destructive testing: tensile test, compression test, hardness test – nondestructive testing (NDT): radiographic methods, ultrasonic methods – thermal methods of NDT: thermography

#### TEXT BOOKS

1. Material science and Engineering, Raghavan V, Prentice Hall of India, Sixth Edition, 2015
2. Materials science, V. Rajendran, McGraw Hill publications 2011

#### REFERENCE BOOKS

1. William D. Callister, Jr., Material Science and Engineering – An Introduction, 8th Edition, John Wiley and Sons, Inc., 2007
2. W. Bolton, “Engineering materials technology”, 3rd Edition, Butterworth and Heinemann, 2001.
3. Donald R. Askeland, Pradeep P. Phule, “The Science and Engineering of Materials”, 5th Edition, Thomson Learning, First Indian Reprint, 2007.
4. William F. Smith, “Structure and Properties of Engineering Alloy

**METHOD OF EVALUATION:**

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 25                             | 75                       | 100   |       |

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

|                        |            |                                                                                                                                                     |
|------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COURSE OUTCOMES</b> | <b>CO1</b> | Explain different types of crystal imperfections such as point, line, and surface defects with relevant applications.                               |
|                        | <b>CO2</b> | Solve numerical problems related to equilibrium concentration of point defects and dislocation mechanisms.                                          |
|                        | <b>CO3</b> | Describe the elastic and inelastic behavior of materials using atomic models and viscoelastic principles                                            |
|                        | <b>CO4</b> | Apply spring-dashpot models to analyze viscoelastic properties of materials.                                                                        |
|                        | <b>CO5</b> | Illustrate plastic deformation mechanisms and explain the importance of strengthening methods like grain refinement and precipitation strengthening |

**ALIGNING WITH PROGRAM OUTCOMES:**

Course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PSO6 | PSO7 | PSO8 | PSO9 | PSO10 |
|-----|-----|-----|-----|-----|-----|------|------|------|------|-------|
| CO1 |     | ✓   | ✓   | ✓   | ✓   | ✓    |      | ✓    | ✓    | ✓     |
| CO2 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    |       |
| CO3 | ✓   |     | ✓   | ✓   | ✓   |      | ✓    | ✓    | ✓    | ✓     |
| CO4 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    |      | ✓    | ✓    | ✓     |
| CO5 | ✓   | ✓   | ✓   |     | ✓   | ✓    | ✓    | ✓    | ✓    | ✓     |

**COURSE OUTCOMES:**

and of the course, the student will be able to:

|                        |            |                                                                                |
|------------------------|------------|--------------------------------------------------------------------------------|
| <b>COURSE OUTCOMES</b> | <b>CO1</b> | Learn about number systems, Boolean algebra, logical operation and logic gates |
|                        | <b>CO2</b> | Understand the working of adder, subtractors, multiplexers and demultiplexers. |
|                        | <b>CO3</b> | Acquire knowledge on flip-flops and storage devices.                           |
|                        | <b>CO4</b> | Gain inputs on architecture of microprocessor 8085.                            |
|                        | <b>CO5</b> | Develop program writing skills .on microprocessor 8085.                        |

**LINKING WITH PROGRAM OUTCOMES:**

Course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

|  | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PSO6</b> | <b>PSO7</b> | <b>PSO8</b> | <b>PSO9</b> | <b>PSO10</b> |
|--|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|--------------|
|  |            | ✓          | ✓          | ✓          | ✓          | ✓           |             | ✓           | ✓           | ✓            |
|  | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           | ✓           | ✓           | ✓           |              |
|  | ✓          |            | ✓          | ✓          | ✓          |             | ✓           | ✓           | ✓           | ✓            |
|  | ✓          | ✓          | ✓          | ✓          | ✓          | ✓           |             | ✓           | ✓           | ✓            |
|  | ✓          | ✓          | ✓          |            | ✓          | ✓           | ✓           | ✓           | ✓           | ✓            |

## : Electronics

Semiconductor - energy bands intrinsic and extrinsic  
conductors- n - type and p - type semiconductors - Diodes -  
Diodes - Voltage regulation.

Transistors-p-n-p and n-p-n transistors - I-V characteristics of UJT.  
and MOSFET Multivibrators astable, monostable, bistable.

Logic gates universal gates - Boolean Algebra - De Morgan's  
theorem - K-map Simplification.

## BOOKS

1. Murugesan. R., - Electricity and Magnetism, 8<sup>th</sup>Edn, 2006, S.Chand and Co, New Delhi.
2. Brijlal and N. Subrahmanyam, Atomic and Nuclear Physics, S. Chand and Co. (All units)
3. V.K.Mehta - Principles of Electronics, S.Chand and Co. Ltd., 2004.
4. Modern Physics, R. Murugesan, Kiruthiga Sivaprasath, S. Chand and Co., 17th Revised Edition, 2014.
5. S. O. Pillai - Solid State Physics, Narosa publication

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1. Brijlal, N.Subramanyan and Jivan Seshan, Mechanics and Electrodynamics (2005), Eurasia Publishing House (Pvt.) Ltd., New Delhi.
2. Perspective of Modern Physics, Arthur Beiser, McGraw Hill.
3. Modern Physics, S. Ramamoorthy, National Publishing and Co.
4. Millman and Halkias- Integrated Electronics, Tata McGraw Hill.

## WEB

1. <http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html>
2. <https://www.queenmaryscollge.edu.in/eresources/undergraduate program/py157>

