

SRI SARADA COLLEGE FOR WOMEN
(AUTONOMOUS),
Reaccredited with 'B++' Grade by NAAC
Affiliated to Periyar University
SALEM - 636 016



PG & RESEARCH DEPARTMENT OF PHYSICS

OUTCOME BASED SYLLABUS

B.Sc. Physics

(Academic Year 2023-24 onwards)

B.Sc., PHYSICS SYLLABUS

Preamble

Physics is one of the basic and fundamental sciences. The curriculum for the graduate programme in Physics is revised as per the UGC guidelines on Learning Outcome based Course Framework. The learner-centric courses let the student progressively develop a deeper understanding of various aspects of physics.

The new curriculum offer courses in the core areas of mechanics, acoustics, optics and spectroscopy, electricity and magnetism, atomic and nuclear physics, solid state, electronics and other fields. The courses will train students with sound theoretical and experimental knowledge that suits the need of academics and industry. In addition to the theoretical course work, the students also learn physics laboratory methods for different branches of physics, specialized measurement techniques, analysis of observational data, including error estimation and etc. The students will have deeper understanding of laws of nature through the subjects like classical mechanics, quantum mechanics, statistical physics etc. The problem solving ability of students will be enhanced. The students can apply principles in physics to real life problems. The courses like integrated electronics and microprocessors will enhance the logical skills as well as employability skills. The numerical methods and mathematical physics provide analytical thinking and provides a better platform for higher level physics for research.

The restructured courses with well-defined objectives and learning outcomes, provide guidance to prospective students in choosing the elective courses to broaden their skills not only in the field of physics but also in interdisciplinary areas. The elective modules of the framework offer students choice to gain knowledge and expertise in specialized domains of physics like astrophysics, medical physics, etc.

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| Programme | B.Sc., Physics |
| Programme Code | |
| Duration | 3 years [UG] |
| Programme Outcomes: (These are mere guidelines. Faculty can create POs based on their curriculum or adopt from UGC or the University for their Programme) | <p>PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study</p> <p>PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully; read and write analytically and present complex information in a clear and concise manner to different groups.</p> <p>PO3: Critical thinking: Capability to apply the analytic thought to a body of knowledge; analyse and evaluate the proofs, arguments, claims, beliefs on the basis of empirical evidences; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach.</p> <p>PO4: Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.</p> <p>PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.</p> <p>PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation</p> <p>PO7: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team</p> <p>PO8: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.</p> <p>PO9: Reflective thinking:</p> |

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| | <p>Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.</p> <p>PO10 Information/digital literacy:</p> <p>Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.</p> <p>PO 11 Self-directed learning:</p> <p>Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.</p> <p>PO 12 Multicultural competence:</p> <p>Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.</p> <p>PO 13: Moral and ethical awareness/reasoning:</p> <p>Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.</p> <p>PO 14: Leadership readiness/qualities:</p> <p>Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.</p> <p>PO 15: Lifelong learning:</p> <p>Ability to acquire knowledge and skills, including „learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.</p> |
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| <p>Programme Specific Outcomes:</p> <p>(These are mere guidelines. Faculty can create POs based on their curriculum or adopt from UGC or University for their Programme)</p> | <p>PSO1: Placement:</p> <p>To prepare the students who will demonstrate respectful engagement with others’ ideas, behaviors, and beliefs and apply diverse frames of reference to decisions and actions.</p> <p>PSO 2: Entrepreneur:</p> <p>To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate start-ups and high potential organizations</p> <p>PSO3: Research and Development:</p> <p>Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.</p> <p>PSO4: Contribution to Business World:</p> <p>To produce employable, ethical and innovative professionals to sustain in the dynamic business world.</p> <p>PSO 5: Contribution to the Society:</p> <p>To contribute to the development of the society by collaborating with stakeholders for mutual benefit</p> |
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SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS), SALEM –16
PG & RESEARCH DEPARTMENT OF PHYSICS
B.Sc PHYSICS
Programme Structure Under CBCS
(For the Academic Year 2023-24 onwards)
Total Credits: 140 + Extra credits (Maximum 28)

FIRST YEAR

SEMESTER - I

| Part | Course | Course Title | Code | No. of Hours | Credit |
|--------------|--|-------------------------------------|---------------------------------|--------------|-----------|
| I | Language | Tamil –I/ Hindi-I/ Sanskrit-I | 23ULTC1/ 23ULHC1/ 23ULSC1 | 6 | 3 |
| II | English | General English-I | 23ULEC1 | 6 | 3 |
| III | Core Course -I | Properties of Matter and Sound | 23UPHCC1 | 5 | 5 |
| | Core Course -II | Properties of Matter-Practical | 23UPHCCQ1 | 4 | 3 |
| | Generic Elective-I | Chemistry-I | 23UPHGEC1 | 3 | 3 |
| | | Chemistry Practical-I | 23UPHGECQ1 | 2 | 2 |
| IV | Skill Enhancement Course | NME: Physics for Everyday life | 23UPHSEC1 | 2 | 2 |
| | Skill Enhancement (Foundation Course) | Introductory Physics | 23UPHSEFC | 2 | 2 |
| Total | | | | 30 | 23 |
| V | <ul style="list-style-type: none"> • Articulation and Idea Fixation skills • Physical Fitness Practice – 35 Hours per semester | | | | |
| | <ul style="list-style-type: none"> • Advanced diploma course in Renewable energy management and Audit Level- 1: Certificate Course 100 hours per year | | | | |

DISCIPLINE SPECIFIC ELECTIVES

1. COMMUNICATION SYSTEMS
2. ENERGY PHYSICS
3. MATHEMATICAL PHYSICS
4. ADVANCED MATHEMATICAL PHYSICS
5. NUMERICAL METHODS AND C PROGRAMMING
6. MATERIALS SCIENCE
7. LASERS AND FIBER OPTICS
8. DIGITAL PHOTOGRAPHY
9. NANO SCIENCE
10. MEDICAL INSTRUMENTATION

NON-MAJOR ELECTIVES

1. PHYSICS FOR EVERYDAY LIFE
2. ASTROPHYSICS
3. MEDICAL PHYSICS
4. HOME ELECTRICAL INSTALLATION
5. PHYSICS OF MUSIC

| Subject Code | Subject Name | Category | L | T | P | Credits | Inst. Hours | Marks |
|--------------|--------------------------------|----------|---|---|---|---------|-------------|-------|
| 23UPHCC1 | PROPERTIES OF MATTER AND SOUND | Core | 4 | 1 | - | 5 | 5 | 75 |

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| COURSE | FIRST SEMESTER – CORE |
| COURSE TITLE | PROPERTIES OF MATTER AND SOUND |
| CREDITS | 5 |
| COURSE OBJECTIVES | Study of the properties of matter leads to information, which is of practical value to both the physicist and the engineers. It, gives us information about the internal forces which act between the constituent parts of the substance. Students who undergo this course are successfully bound to get a better insight and understanding of the subject. |

| UNITS | COURSE DETAILS |
|-----------------|--|
| UNIT-I | ELASTICITY: Hooke's law – stress-strain diagram – elastic constants – Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in stretching and twisting a wire – twisting couple on a cylinder – rigidity modulus by static torsion– torsional pendulum (with and without masses) |
| UNIT-II | BENDING OF BEAMS: Cantilever– expression for Bending moment – expression for depression at the loaded end of the cantilever– oscillations of a cantilever – expression for time period – experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope |
| UNIT-III | FLUID DYNAMICS: <i>Surface tension:</i> definition – molecular forces– excess pressure over curved surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaegar's method–variation of surface tension with temperature <i>Viscosity:</i> definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –corrections – terminal velocity and Stoke's formula– variation of viscosity with temperature |
| UNIT-IV | WAVES AND OSCILLATIONS: Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures- free, damped, forced vibrations –resonance and Sharpness of resonance. Laws of transverse vibration in strings –sonometer – determination of AC frequency using sonometer –determination of frequency using Melde's string apparatus |
| UNIT-V | ACOUSTICS OF BUILDINGS AND ULTRASONICS: Intensity of sound – decibel – loudness of sound –reverberation – Sabine's reverberation formula – acoustic intensity – factors affecting the acoustics of buildings. <i>Ultrasonic waves:</i> production of ultrasonic waves – Piezoelectric crystal method – magnetostriction effect – application of ultrasonic waves |

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| TEXT BOOKS | <ol style="list-style-type: none"> 1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand& Co. 2. BrijLal& N. Subrahmanyam, 2003, Properties of Matter, S.Chand& Co 3. D.R.Khanna & R.S.Bedi, 1969, Textbook of Sound, AtmaRam& sons 4. BrijLal and N.Subrahmanyam, 1995, A Text Book of Sound, Second revised edition,Vikas Publishing House. 5. R.Murugesan,2012, Properties of Matter, S.Chand& Co. |
| REFERENCE BOOKS | <ol style="list-style-type: none"> 1. C.J. Smith, 1960, General Properties of Matter, Orient Longman Publishers 2. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition,R. Chand & Co. 3. A.P French, 1973, Vibration and Waves, MIT Introductory Physics, Arnold-Heinmann India. |
| WEBLINKS | <ol style="list-style-type: none"> 1. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work 2. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html 3. https://www.youtube.com/watch?v=gT8Nth9NWPM 4. https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s 5. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work 6. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/ 7. http://www.sound-physics.com/ 8. http://nptel.ac.in/courses/112104026/ |
| Board of Studies Date :02.05.2023 | |

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:

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| COURSE OUTCOMES | CO1 | Relate elastic behavior in terms of three moduli of elasticity and working of torsion pendulum. |
| | CO2 | Able to appreciate concept of bending of beams and analyze the expression, quantify and understand nature of materials. |
| | CO3 | Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface, soap films provide an analogue solution to many engineering problems. |
| | CO4 | Analyze simple harmonic motions mathematically and apply them. Understand the concept of resonance and use it to evaluate the frequency of vibration. Set up experiment to evaluate frequency of ac mains |

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| | CO5 | Understand the concept of acoustics, importance of constructing buildings with good acoustics. Able to apply their knowledge of ultrasonics in real life, especially in medical field and assimilate different methods of production of ultrasonic waves |
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MAPPING WITH PROGRAM OUT COMES:

Map course out comes (**CO**) for each course with program out comes (**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 | S | S | M | M | S | M | M | S | M | S |
| CO2 | M | S | S | S | M | M | S | M | S | S |
| CO3 | S | M | S | M | S | S | M | S | S | S |
| CO4 | S | S | S | S | S | M | S | M | M | M |
| CO5 | M | M | S | S | M | S | S | S | S | M |

MAPPING WITH PROGRAM SPECIFIC OUT COMES:

Map Course Outcomes (**CO**) for each course with Program Specific Outcomes (**PSO**) in the 3-point scale of STRONG (**S**), MEDIUM (**M**) and LOW(**L**).

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|-------------|-------------|-------------|-------------|-------------|
| CO1 | S | S | M | M | S |
| CO2 | S | M | S | S | M |
| CO3 | S | M | S | M | S |
| CO4 | S | S | S | S | S |
| CO5 | M | M | S | M | S |

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| COURSE | FIRST SEMESTER – CORE COURSE-II |
| COURSE TITLE | Properties of matter -Practical |
| CODE | 23UPHCCQ1 |
| CREDITS | 3 |
| HOURS | 4 |
| COURSE OBJECTIVES | Apply various physics concepts to understand Properties of Matter, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results |

| Properties of Matter (Any 8 of the below list) |
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| <ol style="list-style-type: none"> 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. 10. Determination of Young's modulus by non-uniform bending – scale & telescope. 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 & interfacial surface tension by drop weight method. 17. Determination of co-efficient of viscosity by Stokes' method – terminal velocity. 18. Determination of critical pressure for streamline flow. 19. Determination of Poisson's ratio of rubber tube. 20. Determination of viscosity by Poiseuille's flow method. 21. Determination radius of capillary tube by mercury pellet method. 22. Determination of g using compound pendulum. |
| Board of Studies Date : 02.05.2023 |

METHOD OF EVALUATION:

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

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| Title of the Course | CHEMISTRY- I (FOR PHYSICS) | | | | | | |
| Paper No. | Generic Elective-I | | | | | | |
| Category | Generic Course | Year | I | Credits | 3 | Course Code | 23UPHGEC1 |
| | | Semester | I | | | | |
| Instructional hours per week | Lecture | Tutorial | Lab Practice | | Total | | |
| | 3 | - | - | | 3 | | |
| Prerequisites | Higher secondary chemistry | | | | | | |
| Objectives of the course | <p>This course aims to provide knowledge on the</p> <ul style="list-style-type: none"> • basics of atomic orbitals, chemical bonds, hybridization • concepts of thermodynamics and its applications • concepts of nuclear chemistry • importance of chemical industries • qualitative and analytical methods | | | | | | |

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| <p>Course Outline</p> | <p style="text-align: center;">UNIT I</p> <p>Chemical Bonding and Nuclear Chemistry Chemical Bonding: Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. Molecular orbital diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties. Nuclear Chemistry: Fundamental particles - Isotopes, Isobars, Isotones and Isomers-Differences between chemical reactions and nuclear reactions - group displacement law. Nuclear binding energy - mass defect – calculations; Nuclear fission and nuclear fusion - differences – Stellar energy. Applications of radioisotopes – carbon dating, rock dating and medicinal applications.</p> <p style="text-align: center;">UNIT II</p> <p>Industrial Chemistry Fuels: Fuel gases: natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required). Silicones: Synthesis, properties and uses of silicones. Fertilizers: Urea, ammonium sulphate, potassium nitrate, NPK fertilizer, superphosphate, triple superphosphate.</p> <p style="text-align: center;">UNIT III</p> <p>Fundamental Concepts in Organic Chemistry Hybridization: Orbital overlap, hybridization and geometry of CH₄, C₂H₄, C₂H₂ and C₆H₆. Electronic effects: Inductive effect and consequences on K_a and K_b of organic acids and bases, electromeric, mesomeric, hyperconjugation and steric-examples. Reaction mechanisms: Types of reactions–aromaticity (Huckel’s rule) – aromatic electrophilic substitution; nitration, halogenation, Friedel- Craft’s alkylation and acylation. Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.</p> |
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| | <p style="text-align: center;">UNIT IV</p> <p>Thermodynamics and Phase Equilibria Thermodynamics: Types of systems, reversible and irreversible processes, isothermal and adiabatic processes and spontaneous processes. Statements of first law and second law of thermodynamics. Carnot's cycle and efficiency of heat engine. Entropy and its significance. Free energy change and its importance (no derivation). Conditions for spontaneity in terms of entropy and Gibbs free energy. Relationship between Gibbs free energy and entropy. Phase Equilibria: Phase rule - definition of terms in it. Applications of phase rule to water system. Two component system - Reduced phase rule and its application to a simple eutectic system (Pb-Ag).</p> <p style="text-align: center;">UNIT V</p> <p>Analytical Chemistry Introduction to qualitative and quantitative analysis. Principles of volumetric analysis. Separation and purification techniques – extraction, distillation and crystallization. Chromatography: principle and applications of column, paper and thin layer chromatography.</p> |
| Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper) | Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours). |
| Skills acquired from this course | Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills. |
| Recommended Text | 1. Veeraiyan, V, <i>Text book of Ancillary Chemistry</i> ; High mount publishing house, Chennai, 1 st Ed., 2009. 2. Vaithyanathan, S, <i>Text book of Ancillary Chemistry</i> ; Priya Publications, Karur, 2006. 3. Arun Bahl, S, Bahl, B.S, <i>Advanced Organic Chemistry</i> ; S. Chand and Company, New Delhi, 23 rd Ed., 2012. 4. Soni, P. L, Chawla, H, M, <i>Text Book of Organic Chemistry</i> ; Sultan Chand & sons, New Delhi, 29 th Ed., 2007. |

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| Reference Books | <p>5. Soni, P. L, Mohan Katyal, <i>Text book of Inorganic chemistry</i>; Sultan Chand and Company, New Delhi, 20th Ed., 2007.</p> <p>6. Puri, B.R, Sharma, L.R, & Pathania, M.S, <i>Textbook Physical Chemistry</i>; Vishal Publishing Co., New Delhi, 47th Ed., 2018.</p> <p>7. Sharma, B.K, <i>Industrial Chemistry</i>, GOEL publishing house, Meerut, 19th Ed., 2014.</p> |
| Course Outcomes On completion of the course the students should be able to | |
| <p>CO1: gain in-depth knowledge about the theories of chemical bonding, nuclear reactions and its applications.</p> <p>CO2: evaluate the efficiencies and uses of various fuels and fertilizers</p> <p>CO3: explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.</p> <p>CO4: apply various thermodynamic principles, systems and phase rule.</p> <p>CO5: explain various methods to identify an appropriate method for the separation of chemical components</p> | |

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| Title of the Course | CHEMISTRY PRACTICAL- I (Physics) | | | | | | |
| Paper Name | Generic Elective-I – Chemistry Practical -I | | | | | | |
| Category | Generic Course | Year | I | Credit | 2 | Course Code | 23UPHGECQ1 |
| | | Semester | I | | | | |
| Instructional hours per week | Lecture | Tutorial | | Lab Practice | | Total | |
| | - | - | | 2 | | 2 | |
| Prerequisites | Higher Secondary Chemistry | | | | | | |
| Objectives of the course | This course aims to provide knowledge on the <ul style="list-style-type: none"> ● basics of preparation of solutions. ● principles and practical experience of volumetric analysis. | | | | | | |
| Course Outline | Volumetric analysis <ol style="list-style-type: none"> 1. Estimation of sodium hydroxide using standard sodium carbonate. 2. Estimation of hydrochloric acid using standard oxalic acid. 3. Estimation of ferrous sulphate using standard Mohr's salt. 4. Estimation of oxalic acid using standard ferrous sulphate. 5. Estimation of potassium permanganate using standard sodium hydroxide. 6. Estimation of magnesium using EDTA. 7. Estimation of ferrous ion using diphenyl amine as indicator. | | | | | | |
| Reference Book | Venkateswaran, V, Veerasamy, R, Kulandaivelu, A.R, <i>Basic Principles of Practical Chemistry</i> ; Sultan Chand & sons, 2 nd Ed., 1997. | | | | | | |
| Course Outcomes | | | | | | | |
| On completion of the course the students should be able to | | | | | | | |
| On successful completion of the course the students should be able to | | | | | | | |
| CO1: gain an understanding of the use of standard flask and volumetric pipettes, burette. | | | | | | | |
| CO2: design, carry out, record and interpret the results of volumetric titration. | | | | | | | |
| CO3: apply their skill in the analysis of water /hardness. | | | | | | | |
| CO4: analyze the chemical constituents in allied chemical products. | | | | | | | |

| Subject Code | Subject Name | Category | L | T | P | Credits | Inst. Hours | Marks |
|--------------|--------------------------------------|--------------------------------|---|---|---|---------|-------------|-------|
| 23UPHSEC1 | NME: PHYSICS FOR EVERYDAY LIFE | Skill Enhancement Course | | | | 2 | 2 | 75 |

NON MAJOR ELECTIVE (NME)

| PHYSICS FOR EVERYDAY LIFE | |
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| Learning Objective: 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 | |
| UNITS | COURSE DETAILS |
| UNIT-I | MECHANICS Motion, Force and Newton's laws-momentum-Circular motion – Gravitation-Planetary motion –Rotational Motion –Earth Satellites – Communication Satellites |
| 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, Homi Jehangir Bhabha, Vikram Sarabhai, Subrahmanyam Chandrasekhar, Venkatraman Ramakrishnan, Dr. APJ Abdul Kalam and their contribution to science and technology. |
| TEXT BOOKS | 1. The Physics in our Daily Lives, Umme Ammara, Gugucool Publishing, Hyderabad, 2019. 2. For the love of physics, Walter Lawin, Free Press, New York, 2011. |
| Board of Studies Date : 02.05.2023 | |

METHOD OF EVALUATION:

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

| Subject Code | Subject Name | Category | L | T | P | Credits | Inst. Hours | Marks |
|--------------|-----------------------------|-------------------|---|---|---|---------|-------------|-------|
| 23UPHSEFC | INTRODUCTORY PHYSICS | Foundation Course | | | | 2 | 2 | 75 |

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| COURSE | FIRST SEMESTER - FOUNDATION COURSE |
| COURSE TITLE | INTRODUCTORY PHYSICS |
| CODE | 23UPHSEFC |
| CREDITS | 2 |
| HOURS | 2 |
| COURSE OBJECTIVES | 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. |

| UNITS | COURSE DETAILS |
|---|---|
| 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 |
| TEXT BOOKS | 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.phy-astr.gsu.edu/hbase/permot2.html 2. https://science.nasa.gov/ems/ https://eesc.columbia.edu/courses/eesc/climate/lectures/radiation_hays/ |
| Board of Studies Date : 02.05.2023 | |

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:

| COURSE OUTCOMES | CO1 | Apply concept of vectors to understand concepts of Physics and solve problems |
|--------------------|-----|--|
| | CO2 | Appreciate different forces present in Nature while learning about phenomena related to these different forces. |
| | CO3 | Quantify energy in different process and relate momentum, velocity and energy |
| | CO4 | Differentiate different types of motions they would encounter in various courses and understand their basis |
| | CO5 | Relate various properties of matter with their behaviour and connect them with different physical parameters involved. |

MAPPING WITH PROGRAM OUTCOMES:

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 | S | S | S | S | S | S | S | M | S | M |
| CO2 | M | S | S | S | M | S | S | M | M | M |
| CO3 | S | S | S | M | S | S | S | M | S | M |
| CO4 | S | S | S | S | S | S | S | M | M | M |
| CO5 | S | M | S | S | S | S | S | M | M | S |

MAPPING WITH PROGRAM SPECIFIC OUT COMES:

Map Course Outcomes(CO) for each course with Program Specific Outcomes (PSO) in the 3-point scale of STRONG (S), MEDIUM(M) and LOW(L).

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|-----|------|------|------|------|------|
| CO1 | S | S | M | M | S |
| CO2 | S | M | S | S | M |
| CO3 | S | M | S | M | S |
| CO4 | S | S | S | S | S |
| CO5 | M | M | S | M | S |

SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS), SALEM –16
PG & RESEARCH DEPARTMENT OF PHYSICS
B.Sc PHYSICS
Programme Structure Under CBCS
(For the Academic Year 2023-24 onwards)
Total Credits: 140 + Extra credits (Maximum 28)

FIRST YEAR

SEMESTER - II

| Part | Course | Course Title | Code | No. of Hours | Credit |
|---|--|---|---------------------------------|---------------------|---------------|
| I | Language | Tamil –II / Hindi-II / Sanskrit-II | 23ULTC2/ 23ULHC2/ 23ULSC2 | 6 | 3 |
| II | English | General English-II | 23ULEC2 | 6 | 3 |
| III | Core Course -III | Heat, Thermodynamics and Statistical Physics | 23UPHCC2 | 5 | 5 |
| | Core Course -IV | Heat, Sound, Light and Basic Electronics- Practical | 23UPHCCQ2 | 4 | 3 |
| | Elective –II (GE) | Chemistry-II | 23UPHGEC2 | 3 | 3 |
| | Elective –II (GE) | Chemistry Practical-II | 23UPHGECQ2 | 2 | 2 |
| IV | Skill Enhancement Course –II | NME:Home Electrical Installation | 23UPHSEC2 | 2 | 2 |
| | Skill Enhancement Course -III | IKS: Inherited Indian Knowledge in Astronomy | 23UPHSEC3 | 2 | 2 |
| Total | | | | 30 | 23 |
| V | <ul style="list-style-type: none"> • Articulation and Idea Fixation skills • Physical Fitness Practice – 35 Hours per semester | | | | |
| | <ul style="list-style-type: none"> • Advanced diploma course in Renewable energy management and Audit Level- 1: Certificate Course 100 hours per year | | | | |
| Extra Credits are given for extra skills and courses qualified in MOOC/NPTEL | | | | | |

Project work is given as an Elective paper in VI Semester for students admitted in the academic year 2021-2022.

| Subject Code | Subject Name | Category | L | T | P | Credits | Inst. Hours | Marks |
|--------------|--|----------|---|---|---|---------|-------------|-------|
| 23UPHCC2 | HEAT, THERMODYNAMICS AND STATISTICAL PHYSICS | Core | 4 | 1 | - | 5 | 5 | 70 |

| | |
|--------------------------|---|
| COURSE | SECOND SEMESTER – CORE |
| COURSE TITLE | HEAT, THERMODYNAMICS AND STATISTICAL PHYSICS |
| CREDITS | 5 |
| COURSE OBJECTIVES | 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 |

| UNITS | COURSE DETAILS |
|-----------------|---|
| UNIT-I | CALORIMETRY: specific heat capacity – specific heat capacity of gases C_p & C_v – Meyer’s relation – Joly’s method for determination of C_v – Regnault’s method for determination of C_p 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 demagnetisation. |
| UNIT-II | THERMODYNAMICS-I: Zeroth law and first law of thermodynamics – P-V diagram – heat engine – efficiency of heat engine (problems) – 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 – thermodynamical scale of temperature – Maxwell’s thermodynamical relations – Clausius-Clapeyron’s equation (first latent heat equation) – third law of thermodynamics – unattainability of absolute zero – heat death- Entropy change in different phases – Problems |
| UNIT-IV | HEAT TRANSFER: modes of heat transfer: conduction, convection and radiation. <i>Conduction:</i> 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. <i>Radiation:</i> black body radiation (Ferry’s method) – distribution of energy in black body radiation – Wien’s law and Rayleigh Jean’s law – Planck’s law of radiation – Stefan’s law – deduction of Newton’s law of cooling from Stefan’s law. |
| 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. |
|--|---|

| | |
|------------------------|--|
| TEXT BOOKS | <ol style="list-style-type: none"> 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 1st Edition, Text book of Sound, Kedharnaath 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. 6. R.Murugesan & Kiruthiga Sivaprasath, Thermal Physics, S.Chand & Co. |
| REFERENCE BOOKS | <ol style="list-style-type: none"> 1. J.B.Rajam & C.L.Arora, 1976, Heat and Thermodynamics, 8th edition, S.Chand & Co. Ltd. 2. D.S.Mathur, Heat and Thermodynamics, Sultan Chand & Sons. 3. Gupta, Kumar, Sharma, 2013, Statistical Mechanics, 26th Edition, S. Chand & Co. 4. Resnick, Halliday & Walker, 2010, Fundamentals of Physics, 6th Edition. 5. Sears, Zemansky, Hugh D. Young, Roger A. Freedman, 2021 University Physics with Modern Physics 15th Edition, Pearson. |
| WEBLINKS | <ol style="list-style-type: none"> 1. https://youtu.be/M_5KYncYNyc 2. https://www.youtube.com/watch?v=4M72kQulGKk&vl=en |

Board of Studies Date : 02.11.2023

METHOD OF EVALUATION:

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|--------------------------------|--------------------------|-------|-------|
| 30 | 70 | 100 | |

COURSE OUTCOMES:

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

| | | |
|----------------------------|------------|--|
| COURSE OUTCOMES | CO1 | Acquires knowledge on how to distinguish between temperature and heat. Introduce him/her to the field of thermometry and explain practical measurements of high temperature as well as low temperature physics. Student identifies the relationship between heat capacity, specific heat capacity. The study of Low temperature Physics sets the basis for the students to understand cryogenics, superconductivity, super fluidity and Condensed Matter Physics |
| | CO2 | Derive the efficiency of Carnot's engine. Discuss the implications of the laws of Thermodynamics in diesel and petrol engines |
| | CO3 | Able to analyze performance of thermodynamic systems viz efficiency by problems. Gets an insight into thermodynamic properties like enthalpy, entropy |
| | CO4 | Study the process of thermal conductivity and apply it to good and bad conductors. Quantify different parameters related to heat, relate them with various physical parameters and analyse them |
| | CO5 | Interpret classical statistics concepts such as phase space, ensemble, Maxwell-Boltzmann distribution law. Develop the statistical interpretation of Bose-Einstein and Fermi-Dirac. Apply to quantum particles such as photon and electron |

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 | S | S | S | S | S | S | S | M | S | M |
| CO2 | M | S | S | S | M | S | S | M | M | M |
| CO3 | S | S | S | M | S | S | S | M | S | M |
| CO4 | S | S | S | S | S | S | S | M | M | M |
| CO5 | S | S | M | S | S | S | M | M | S | M |

| Subject Code | Subject Name | Category | L | T | P | Credits | Inst. Hours | Marks |
|--------------|--|----------|---|---|---|---------|-------------|-------|
| 23UPHCCQ2 | Heat, Sound, Light and Basic Electronics-Practical | Core | 1 | - | 3 | 3 | 4 | 70 |

| | |
|--|--|
| COURSE | SECOND SEMESTER - CORE |
| COURSE TITLE | Heat, Sound, Light and Basic electronics-Practical |
| CREDITS | 3 |
| COURSE OBJECTIVES | The aim of the course is to gain practical knowledge to explore the concepts involved in heat, sound, light and electronics. |
| Heat, Sound, Light and Basic electronics (Any Eight of the below list) | |
| <ol style="list-style-type: none"> 1. Specific heat capacity of solid by the method of mixtures- Half-time correction. 2. Thermal conductivity of a bad conductor- Lee's disc. 3. Sonometer- Frequency of Tuning fork 4. Sonometer- AC frequency (Steel and Brass wire) 5. Focal length of long focus convex lens - U-V method, Conjugate foci method and combination method. 6. Spectrometer -Refractive index- Solid prism 7. Study of AND, OR and NOT gates using discrete components. 8. Characteristics of Zener diode. 9. Mirror Galvanometer- Current and voltage sensitiveness. 10. To verify the laws of Transverse vibration using Melde's apparatus. | |
| Board of Studies Date : 02.11.2023 | |

METHOD OF EVALUATION:

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

| | | | | | | | |
|-------------------------------------|---|-----------------|---------------------|----------------|--------------|--------------------|------------------|
| Title of the Course | CHEMISTRY-II (FOR PHYSICS) | | | | | | |
| Course No. | Elective -II (GE) | | | | | | |
| Category | Generic Elective | Year | I | Credits | 3 | Course Code | 23UPHGEC2 |
| | | Semester | II | | | | |
| Instructional hours per week | Lecture | Tutorial | Lab Practice | | Total | | |
| | 3 | - | - | | 3 | | |
| Prerequisites | Chemistry for physical sciences -I | | | | | | |
| Objectives of the course | <p>This course aims at providing knowledge on the</p> <ul style="list-style-type: none"> • Co-ordination Chemistry and Water Technology • Carbohydrates and Amino acids • Basics and types of polymers • Basics and applications of kinetics and catalysis • Various photochemical phenomenon | | | | | | |
| Course Outline | UNIT I | | | | | | 15 Hours |
| | <p>Co-ordination Chemistry and Water Technology Co-ordination Chemistry: Definition of terms-IUPAC Nomenclature - Werner's theory - EAN rule - Pauling's theory – Postulates - Applications to $[\text{Ni}(\text{CO})_4]$, $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{Co}(\text{CN})_6]^{3-}$ Chelation - Biological role of Haemoglobin and Chlorophyll (elementary idea) – Applications in qualitative and quantitative analysis. Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques-BOD, COD.</p> | | | | | | |
| | UNIT II | | | | | | 15 Hours |
| | <p>Carbohydrates and Amino acids Carbohydrates: Classification, preparation and properties of glucose, fructose and sucrose. Discussion of open chain ring structures of glucose and fructose. Glucose –fructose interconversion. Properties of starch and cellulose. Amino acids: Classification - preparation and properties of alanine, preparation of dipeptides using Bergmann method. RNA and DNA (elementary idea only).</p> | | | | | | |
| | UNIT III | | | | | | 15 Hours |
| | <p>Electrochemistry Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials -electrochemical series. Strong and weak electrolytes - ionic product of water -pH, pKa, pKb. Conductometric titrations - pH determination by colorimetric method – buffer solutions and its biological applications - electroplating - Nickel and chrome plating – Types of cells -fuel cells-corrosion and its prevention.</p> | | | | | | |

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|---|---|
| | <p style="text-align: center;">UNIT IV 15 Hours</p> <p>Kinetics and Catalysis Order and molecularity. Integrated rate expression for I and II ($2A \rightarrow$ Products) order reactions. Pseudo first order reaction, methods of determining order of a reaction – Half-life period – Catalysis - homogeneous and heterogeneous, catalyst used in Contact and Haber's processes. Concept of energy of activation and Arrhenius equation.</p> |
| | <p style="text-align: center;">UNIT V 15 Hours</p> <p>Photochemistry Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield - Hydrogen-chloride reaction. Phosphorescence, fluorescence, chemiluminescence and photosensitization and photosynthesis (definition with examples).</p> |
| Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper) | Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours) |
| Skills acquired from this course | Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills. |
| Recommended Text | <ol style="list-style-type: none"> 1. Veeraiyan V., <i>Textbook of Ancillary Chemistry</i>; Highmount Publishing House, Chennai, 1stEd.,2009. 2. Vaithyanathan S., <i>Text Book of Ancillary Chemistry</i>; Priya Publications, Karur,2006. 3. Arun Bahl, Bahl B.S., <i>Advanced Organic Chemistry</i>; S.Chand and Company, New Delhi, 23rd Ed., 2012. 4. Puri R., Sharma L. R., Pathania M. S., <i>Text Book Physical Chemistry</i>; Vishal Publishing Co., New Delhi, 47th Ed., 2018. |
| Reference Books | <ol style="list-style-type: none"> 1. Soni P.L., Mohan Katyal, <i>Text book of Inorganic Chemistry</i>, Sultan Chand and Company, New Delhi, 20th Ed, 2007. 2. Sharma B.K., <i>Industrial Chemistry</i>, Meerut, 16th Ed, 2014. 3. Soni P.L., Chawla H.M., <i>Text Book of Organic Chemistry</i>, Sultan Chand & sons, New Delhi, 29th Ed., 2007. |

Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to

- CO 1:** write the IUPAC name for complex, different theories to explain the bonding in coordination compounds and water technology
- CO 2:** explain the preparation and property of carbohydrate, amino acids and nucleic acids.
- CO 3:** apply the electrochemistry principles in corrosion, electroplating and fuel cells.
- CO 4:** identify the reaction rate, order for chemical reactions and explain the purpose of a catalyst.
- CO 5:** outline the various types of photochemical process.

Board of Studies Date : 02.11.2023

| | | | | | | | |
|--|---|-----------------|---------------------|----------------|--------------|--------------------|-------------------|
| Title of the Course | CHEMISTRY PRACTICAL-II (Physics/ Home Science) | | | | | | |
| Course No. | Elective-II (GE) | | | | | | |
| Category | Generic Elective | Year | I | Credits | 2 | Course Code | 23UPHGECQ2 |
| | | Semester | II | | | | |
| Instructional hours per week | Lecture | Tutorial | Lab Practice | | Total | | |
| | - | - | 2 | | 2 | | |
| Prerequisites | | | | | | | |
| Objectives of the course | <p>This course aims to provide knowledge on</p> <ul style="list-style-type: none"> ● identification of organic functional groups ● different types of organic compounds with respect to their properties. ● determination of elements in organic compounds. | | | | | | |
| | <p>SYSTEMATIC ANALYSIS OF ORGANIC COMPOUNDS The analysis must be carried out as follows:</p> <ol style="list-style-type: none"> (a) Functional group tests [phenol, acids (mono & di) aromatic primary amine, amides (mono & di), aldehyde and glucose]. (b) Detection of elements (N, S, Halogens). (c) To distinguish between aliphatic and aromatic compounds. (d) To distinguish – Saturated and unsaturated compounds. | | | | | | |
| Reference Books | Venkateswaran V, Veerasamy R, Kulandaivelu A R, <i>Basic Principles of Practical Chemistry</i> ; Sultan Chand & sons, 2 nd Ed., 1997. | | | | | | |
| <p>Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to CO1: observe the physical state, odour, colour and solubility of the given organic compound. CO2: identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis. CO3: analyze the given organic compound and explain the reactions behind it.</p> | | | | | | | |

Board of Studies Date : 02.11.2023

| Subject Code | Subject Name | Category | L | T | P | Credits | Inst. Hours | Marks |
|--------------|---|---------------------------------|---|---|---|---------|-------------|-------|
| 23UPHSEC2 | Skill Enhancement Course –II NME: HOME ELECTRICAL INSTALLATION | Skill Enhancement Course | 2 | - | - | 2 | 2 | 70 |

NON MAJOR ELECTIVE (NME)

| HOME ELECTRICAL INSTALLATION | |
|--|--|
| Learning Objective: The students will get knowledge on electrical instruments, installations and domestic wiring techniques with safety precautions and servicing | |
| UNITS | COURSE DETAILS |
| UNIT-I | SIMPLE ELECTRICAL CIRCUITS: Fundamentals of Electricity - Current, Volt, Resistance - Ohm’s Law - Capacitance -Inductance - Electrical Charge -Electrical Energy-Electric Potential-Familiarizing Ammeter, Voltmeter and Multimeter- difference between DC and AC Activity 1. Construction of Simple circuits 2. Continuity checking of electrical circuits using multimeter- Hands on training |
| UNIT-II | TRANSMISSION OF ELECTRICITY: Production and transmission of electricity – concept of power grid – roles of step-up and step-down transformers-transmission losses (qualitative) – – Selecting Quality Cables and Wires- – characteristics of single and multicore wires |
| UNIT-III | ELECTRICAL WIRING COMPONENTS AND ACCESSORIES: Wiring materials-Wiring Accessories-(a) different types of switches -(b) Holders-(c) Ceiling rose-(d) Socket outlet/plug-(e) Main switch-(f) PVC casing-capping wiring-Conduit Wiring-Concealed Wiring- installation of Wiring Accessories on Board. Activity Basic electrical wiring using web resources |
| 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 –electrical energy unit in kWh – calculation of EB bill –single and three phase connections – Measures to save electrical energy – |

| | |
|---|--|
| | <p>Activity</p> <p>1. Power rating of home appliances 2. Calculation of EB Bill of their Houses</p> |
| UNIT-V | <p>SAFETY MEASURES: Insulation for wires – colour specification for mains, return and earth – Understanding of fuse and circuit breakers – purpose of earth line – lighting arrestors – short circuiting and over loading – electrical safety – tips to avoid electrical shock – first aid for electrical shock .</p> <p>Activity</p> <p>1. Replacing fuse wire 2. Protection of House from an electrical shock -Earthing</p> |
| TEXT BOOKS | <p>1. Wiring a House: 5th Edition by Rex Cauldwell, (2014). 2. Black & Decker Advanced Home Wiring, 5th Edition: Backup Power - Panel Upgrades - AFCI Protection - "Smart" Thermostats, by Editors of Cool Springs Press, (2018). 3. Complete Beginners Guide to Rough in Electrical Wiring: by Kevin Ryan (2022).</p> |
| Board of Studies Date : 02.11.2023 | |

METHOD OF EVALUATION:

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|---------------------------------------|---------------------------------|--------------|--------------|
| 30 | 70 | 100 | |

| Subject Code | Subject Name | Category | L | T | P | Credits | Inst. Hours | Marks |
|--------------|---|--------------------------------|---|---|---|---------|-------------|-------|
| 23UPHSEC3 | Skill Enhancement Course –III IKS: Inherited Indian Knowledge In Astronomy | Skill Enhancement Course | 2 | - | - | 2 | 2 | 70 |

SKILL ENHANCEMENT COURSE (SEC - 3)

| IKS: INHERITED INDIAN KNOWLEDGE IN ASTRONOMY | |
|---|---|
| Learning Objective: To help students to trace, identify and acquire the significant Indian astronomical knowledge. | |
| UNITS | COURSE DETAILS |
| UNIT-I | Science of Astronomy History of Indian Astronomy – Vedic Period and Vedāngajyotisa - Siddhanta – Aryabhata - Jyotiḥśāstra – three shandhas of Ganita (Astronomy), Horā (Horoscopic Astrology and Saṃhitā (Omens and Natural Phenomena) - Some of the prominent astronomers and their important contributions – Continuity in Astronomical tradition |
| UNIT-II | Celestial Sphere Diurnal motion of celestial bodies – Motion of celestial bodies relative to stars – Celestial horizon, meridian – Pole star and directions – Zodiac and Constellations – Equator and poles – Latitude at a place and Altitude of pole Star – Ecliptic and Equinoxes – Causes of Lunar and Solar Eclipses Co-ordinate Systems Celestial Longitude and Latitude – (Ecliptic System) – Right Ascension and declination (Equatorial System) -Azimuth and Altitude(Horizontal System) – hour Angle and declination (Meridian System) – Phenomenon of Precession of Equinoxes – Tropical (Sāyana) and Sideral (Nirayana) Longitudes |
| UNIT-III | Time in Indian Astronomy Introduction – Civil Day and sidereal day – Solar Year and Civil Calendar – Solar Month and Lunar Month – Luni – Solar Year (Lunar Year) – Adhikamāsa and Ksayamāsa – Yuga system – Indian Eras – Time on Microcosmic Scale |
| UNIT-IV | Calendar and Indian Pañcāṅga Introduction – Gregorian Calendar – Hindu Calendar – Islamic calendar – Indian Calendar and Pañcāṅga – Thithi – Naksatra – Yoga – Karana – Vāra Rāsi and Nakṣatra Systems Zodiac and Rāsis – Naksatra System |
| UNIT-V | Tripraśna – Direction, place and Time Introduction – Determination of the North-South Line – Finding Latitude and Co – latitude of a place – Rising and setting points of the sun (Variation and declination) – Times of Sunrise and Sunset – Rising of Signs and Zodiac |

| | |
|---|---|
| | – intervals of rising of Sāyana Rāśis (or Signs) – Determination of Lagna at a given time and place |
| TEXT BOOKS | <p>1. S. N. Sen and K. S. Shukla, History of Astronomy in India, 2nd Ed., INSA, Delhi, 2001.</p> <p>2. S. Balachandra Rao, Indian Astronomy An Introduction, Universities Press, Hyderabad, 2000</p> <p>3. History of Astronomy: A Handbook, Edited by K. Ramasubramanian, Aniket Sule and Mayank Vahia, SandHI, IIT Bombay, and T.I.F.R. Mumbai, 2016.</p> <p>4. B.V. Subbarayappa and K.V. Sarma, Indian Astronomy: A Source Book, Nehru Centre, Bombay, 1985</p> |
| Board of Studies Date : 02.11.2023 | |

METHOD OF EVALUATION:

| Continuous Internal Assessment | End Semester Examination | Total | Grade |
|---------------------------------------|---------------------------------|--------------|--------------|
| 30 | 70 | 100 | |