

Shiv Chhatrapati Shikshan Sanstha's
Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)



**Structure and Curriculum of Four Year Multidisciplinary
Degree (Honors/Research) Programme with Multiple
Entry and Exit option**

Undergraduate Programme of Science and Technology
B.Sc. (Honors/Research) in Physics

Board of Studies
in
Physics
Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)

w.e.f. June, 2023
(In Accordance with NEP-2020)

CERTIFICATE

I hereby certify that the documents attached are the Bonafide copies of the Curriculum of **B.Sc. (Honors/Research) in Physics** Programme to be effective from the **Academic Year 2023-24.**

Date: 14/07/2023

Place: Latur



(Dr A. A. Yadav)

Chairperson

Board of Studies in Physics

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)



Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Members of Board of Studies in the Subject Physics Under the Faculty of Science and Technology

| Sr. No. | Name | Designation | In position |
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| 1 | Dr A. A. Yadav Head, Department of Physics & Electronics Rajarshi Shahu Mahavidyalaya (Autonomous), Latur | Chairperson | HoD |
| 2 | Prof. Dr. V. P. Pawar, Head, Department of Physics, Maharashtra Udaygiri Mahavidyalaya , Udgir Dist: Latur | Member | V.C. Nominee |
| 3 | Dr R. H. Kadam, Shrikrishna Mahavidyalaya, Gunjoti, Umerga | Member | Academic Council Nominee |
| 4 | Mrs Shyamala Bhodhane Head, Department of Physics, Xt. Xavier's College, Mumbai | Member | Expert from outside for Special Course |
| 5 | Shri Gundu Sabde Relyon Industries, Pune | Member | Expert from Industry |
| 6 | Dr K. N. Shivalkar Head, Department of physics, Mahatma Gandhi Mahavidyalaya, Ahmedpur Dist. Latur | Member | P.G. Alumni |
| 7 | Dr D. G. Palke Head, Department of Chemistry, | Member | Faculty Member |
| 8 | Dr Dayanand Raje | Member | Member from same Faculty |
| 9 | Mr Swapnil Undalkar | Member | Member from same Faculty |
| 10 | Mr Atul More | Member | Member from same Faculty |
| 11 | Mr Akshay Mungle | Member | Member from same Faculty |

From the Desk of the Chairperson...

“Creativity is intelligence having fun” – Albert Einstein

I welcome you all. We have immense pleasure to share that our department is one of the star department with the state-of-the-art facilities and has highly qualified and dignified faculty. The department addresses the critical challenges to face the society, industry and the academia. I take great pride in sharing that from the academic year 2023-24, development of our Physics curriculum is with the objectives and guidelines as per the National Education Policy 2020. National Education Policy 2020 is a comprehensive framework for education in India that aims to transform the existing education system. The NEP 2020 emphasizes a holistic and multidisciplinary approach to education, focusing on the overall development of students.

Our curriculum as per NEP 2020 reflects: A balanced mix of theoretical concepts, practical applications, and problem solving skills. Incorporate interdisciplinary connections and encourage the integration of Physics with other subjects where appropriate. Inclusion of emerging topics and advancements in Physics, such as Quantum mechanics, Astrophysics, Nuclear Physics, Renewable Energy, etc. Design learning outcomes that emphasize conceptual understanding, critical thinking, analytical skills, and practical applications. Encourage project-based learning, hands-on experiments, and inquiry-based activities to foster active student engagement and exploration. Explore the integration of technology tools and resources. Promotes inclusivity, gender sensitivity, and addresses the needs of students with diverse backgrounds and abilities.

Our department organizes workshops, training programs, and seminars to update physics teachers about the revised curriculum, instructional strategies, and assessment methods. Encourage teachers to engage in professional development activities, research, and collaboration to enhance their pedagogical skills. Provide support and resources for teachers to integrate technology effectively into their teaching practices.

Our assessment methods are innovative, such as project portfolios, oral presentations, demonstrations, and performance based assessments in addition to traditional written exams. Facilitate collaborations with research institutions, industries, and organizations to provide students with real-world exposure and opportunities for internships or mentor-ship programs.

Let me take the opportunity to thank and wish you all a great success.



(Dr A.A. Yadav)
Chairperson
Board of Studies in Physics



Rajarshi Shahu Mahavidyalaya, Latur

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Rajarshi Shahu Mahavidyalaya, Latur

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Faculty of Science and Technology

**Structure for Four Year Multidisciplinary Undergraduate Degree Programme in
Physics Multiple Entry and Exit (In accordance with NEP-2020)**

| Year & Level | Sem | Major | | Minor | GE/OE | VSC/SEC (VSEC) | AEC/VEC | OJT,FP,CEP, RP | Credit per Sem. | Cum./Cr. per exit |
|--------------|----------|---|-----|-------|---------------|----------------------------------|--------------------------------------|--|-----------------|-----------------------|
| | | DSC | DSE | | | | | | | |
| 1 | 2 | 3 | | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| I 4.5 | I | DSC I: 04 Cr. DSC II: 04 Cr. | NA | NA | GE-I: 04 Cr. | VSC-I: 02 Cr. SEC-I: 02 Cr. | AEC-I MIL: 02 Cr. VEC-I: 02 Cr. | CC-I: 02 Cr. (NSS, NCC, Sports, Cultural)/ CEP-I: 02 Cr. (SES-I)/ OJT: 02 Cr. / Mini Project: 02 Cr. | 22 | 44 Cr. UG Certificate |
| | II | DSC III: 04 Cr. DSC IV: 04 Cr. (IKS) | NA | NA | GE-II: 04 Cr. | VSC-II: 02 Cr. SEC-II: 02 Cr. | AEC-II MIL: 02 Cr. VEC-II: 02 Cr. | CC-II: 02 Cr. (NSS, NCC, Sports, Cultural)/ CEP-II: 02 Cr. (SES-II)/ OJT: 02 Cr. / Mini Project: 02 Cr. | 22 | |
| | Cum. Cr. | 16 | - | - | 08 | 04+04 = 08 | 04+02 +02=08 | 04 | 44 | |

Exit Option: Award of UG Certificate in Major with 44 Credits and Additional 04 Credits Core NSQF Course/Internship or continue with Major and Minor

Abbreviations:

1. **DSC : Discipline Specific Core (Major)**
2. **DSE : Discipline Specific Elective (Major)**
3. **DSM : Discipline Specific Minor**
4. **GE/OE : Generic/Open Elective**
5. **VSEC : Vocational Skill and Skill Enhancement Course**
6. **VSC : Vocational Skill Courses**
7. **SEC : Skill Enhancement Course**
8. **AEC : Ability Enhancement Course**
9. **MIL : Modern Indian Languages**
10. **IKS : Indian Knowledge System**
11. **FSRCE : Fostering Social Responsibility & Community Engagement**
12. **VEC : Value Education Courses**
13. **OJT : On Job Training**
14. **FP : Field Projects**
15. **CEP : Community Engagement and Service**
16. **CC : Co-Curricular Courses**
17. **RP : Research Project/Dissertation**
18. **SES : Shahu Extension Services**



Rajarshi Shahu Mahavidyalaya, Latur

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Department of Physics

B.Sc. (Honors/Research) in Physics

| Year & Level | Semester | Course Code | Course Title | Credits | No. of Hrs. | |
|--|----------------------|-------------------------------|--------------------------------------|-----------|-------------|--|
| I 4.5 | I | 101PHY1101 (DSC-I) | Mechanics and Properties of Matter-I | 03 | 45 | |
| | | 101PHY1103 | Lab Course-I | 01 | 30 | |
| | | 101PHY1102 (DSC-II) | Heat and thermodynamics-II | 03 | 45 | |
| | | 101PHY1104 | Lab Course-II | 01 | 30 | |
| | | GE-I | From Basket | 04 | 60 | |
| | | 101PHY1501 (VSC-I) | Domestic Electrical Wiring | 02 | 45 | |
| | | (SEC-I) | From Basket | 02 | 30 | |
| | | (AEC-I) | From Basket | 02 | 30 | |
| | | (VEC-I) | Constitution of India | 02 | 30 | |
| | | AIPC/OJT-I | Mini Project | 02 | 60 | |
| | Total Credits | | | | 22 | |
| | II | 101PHY2105 (DSC-III) | Electricity and Magnetism-III | 03 | 45 | |
| | | 101PHY2107 | Lab Course-III | 01 | 30 | |
| | | 101PHY2106 (DSC-IV) IKS | Introduction to Indian Astronomy-IV | 03 | 45 | |
| | | 101PHY2108 | Lab Course-IV | 01 | 30 | |
| | | GE-II | From Basket | 04 | 60 | |
| | | 101PHY2502 (VSC-II) | Weather Forecasting | 02 | 45 | |
| | | (SEC-II) | From Basket | 02 | 30 | |
| | | (AEC-II) | From Basket | 02 | 30 | |
| | | (VEC-II) | FSRCE (CBPR) | 02 | 30 | |
| AIPC/OJT-II | | Mini Project | 02 | 60 | | |
| Total Credits | | | | 22 | | |
| Total Credits (Semester I & II) | | | | 44 | | |



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Faculty of Science & Technology

| Programme Outcomes (POs) for B.Sc. Programme | |
|---|--|
| PO 1 | |
| PO 2 | |
| PO 3 | |
| PO 4 | |
| PO 5 | |
| PO 6 | |
| PO 7 | |



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| Programme Specific Outcomes (PSOs) for B.Sc. Physics (Honors/Research) | |
|--|--|
| PSO No. | Upon completion of this programme the students will be able to |
| PSO 1 | Distinguish core knowledge on various courses of Physics. |
| PSO 2 | Recognize the concepts which help them in understanding physical phenomenon in nature. |
| PSO 3 | Classify skills and competencies to conduct scientific experiments related to Physics. |
| PSO 4 | Identify their area of interest and further specialize in the Physics. |
| PSO 5 | Operate advanced knowledge and skills in job market for various technical industries. |
| PSO 6 | Relate their knowledge and skills in carrying out independent work. |
| PSO 7 | Analyze situations, search for truth and extract information, formulate and solve problems in a systematic and logical manner. |
| PSO 8 | Discuss debate and communicate in a clear and logical way, with graduates in Physics and other fields. |
| PSO 9 | Demonstrate relevant generic skills and global competencies. |



Rajarshi Shahu Mahavidyalaya, Latur

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Department of Physics

Course Type: DSC-I

Course Title: Mechanics and Properties of Matter-I

Course Code: 101PHY1101

Credits: 03

Max. Marks: 75

Lectures: 45 Hrs.

Learning Objectives:

- LO 1. To make students familiar about the relation between gravitation, mass, gravitational energy and potential energy,
- LO 2. To enrich students with the knowledge of properties of fluids,
- LO 3. To develop understanding of elastic nature of materials,
- LO 4. To build up an understanding of fundamental physical principles,
- LO 5. To build up basic skills necessary for solving problems with practical applications by using physical principles,
- LO 6. To equip students with the skills required for understanding of physical principles in terms of multiple representations: graphs, diagrams, equations,
- LO 7. To familiarize students with the basic data analysis skills.

Course Outcomes:

After completion of course the student will be able to-

- CO 1. Apply Kepler's law to describe the motion of planets and satellite in circular orbit, through the study of law of Gravitation.
- CO 2. Explain the phenomena of simple harmonic motion and the properties of systems executing such motions.
- CO 3. Explain various forms of potential energy,
- CO 4. Use kinematic equations to describe non-accelerated and accelerated motions of an object, Apply Newton's laws of motion to solve linear dynamic problems,
- CO 5. Apply Newton's laws of motion to solve linear dynamic problems,
- CO 6. Use the work-energy approach to solve dynamic problems involving conservative and non-conservative forces,
- CO 7. Apply rotational analogs of Newton's laws of motion to solve dynamics problems involving rotational motion.

| Unit No. | Title of Unit & Contents | Hrs. |
|-----------|--|-----------|
| I | Gravitation | 11 |
| | <p>1. Introduction, Kepler's laws: Newton's law of gravitation, Newton's deductions from Kepler's laws.</p> <p>2. Density of the earth, mass of the earth and sun, gravitational field.</p> <p>3. Gravitational potential: PE, gravitational potential at point distant r from a body of mass m.</p> <p>4. Gravitational potential due to a spherical shell: a) at a point outside the shell, b) at a point on the surface of the shell, c) at a point inside the shell, gravitational potential due to a solid sphere</p> <p>5. Numerical problems.</p> <p>Unit Outcomes:</p> <p>UO 1. Understand that all objects, irrespective of their mass, experience the same acceleration 'g' when falling freely under the influence of gravity at the same point on the Earth.</p> <p>UO 2. Understand that if gravity is the only force acting on an object, the sum of kinetic energy and gravitational energy is constant.</p> | |
| II | Elasticity | 12 |
| | <p>1. Introduction to Elasticity</p> <p>2. Load, stress and strain, Hooke's law, factors affecting on elasticity</p> <p>3. Three types of elasticity,</p> <p>4. Twisting couple on a cylinder, torsional pendulum,</p> <p>5. Determination of coefficient of modulus of rigidity of a wire: statistical method, dynamical method Maxwell's needle,</p> <p>6. Bending of beams, bending moment, cantilever loaded at free end: when the weight of the beam is ineffective and effective, beam loaded at the center,</p> <p>7. Numerical problems.</p> <p>Unit Outcome:</p> <p>UO 1. Understand the principles of Elasticity through the study of Young modulus and Modulus of rigidity.</p> | |

| Unit No. | Title of Unit & Contents | Hrs. |
|------------|---|-----------|
| III | Surface Tension | 11 |
| | <ol style="list-style-type: none"> 1. Introduction 2. Explanation of surface tension, surface film and surface energy, units and dimensions of surface tension. 3. Shape of meniscus in capillary tube, angle of contact, pressure difference across a liquid surface (case of drops and bubbles). 4. Rise of liquid in a capillary tube. 5. Experimental determination of surface tension by Jaeger's method and Ferguson method, 6. Factors affecting surface tension. 7. Numerical problems. | |
| | <p>Unit Outcomes:</p> <p>UO 1. Explain certain properties of water using the concept of cohesive forces and surface tension.</p> <p>UO 2. Describe how surface tension encourages liquid droplets and soap films to minimize their surface areas.</p> | |
| IV | Viscosity | 11 |
| | <ol style="list-style-type: none"> 1. Introduction to Viscosity 2. Rate of flow of fluid, lines and tubes of flow, Critical Velocity 3. Reynolds number, significance of Reynolds number, Reynolds equation of continuity of flow 4. Energy of liquid, coefficient of viscosity 5. Poiseuille's equation for flow of liquid through a horizontal capillary tube, η by Poiseuille's method 6. Stoke's law, Rotation viscometer 7. Variation of viscosity of a liquid with temperature and pressure 8. Numerical problems | |
| | <p>Unit Outcomes:</p> <p>UO 1. Understand simple principles of fluid flow and the equations governing fluid dynamics.</p> <p>UO 2. Recognize that when there is an increase in temperature, the viscosity of liquids decreases. Whereas the viscosity of gases increases with the rise in temperature.</p> | |

Learning Resources:

1. Elements of Properties of Matter- D.S Mathur, Shyamlal charitable trust, New Delhi.
2. General Properties of Matter-J. C. Upadhyaya, Ram Prasad and Sons publishers.
3. Properties of Matter- Brijlal and Subramanyam, S. Chand and Co.
4. Fundamentals of Physics, David Halliday, Robert Resnick, Jearl Walker, Wiley India Pvt. Ltd (2016) Tenth Edition
5. University Physics with Modern Physics, Hugh D. Young, Roger A. Freedman, Pearson (2016) Fourteenth Edition
6. A Text Book of Mechanics And Properties of Matter, B. S. Agarwal and Dr R.N. Mishra, Kedar Nath Ram Nath (S.J Publications) Meerut
7. Concepts of Physics , H.C. Verma , Bharati Bhawan (Publishers & Distributors); Noida
8. Introduction to Classical Mechanics: With Problems and Solutions, David Morin (Publisher: Cambridge University Press).



Rajarshi Shahu Mahavidyalaya, Latur

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Department of Physics

Course Type: Lab Course

Course Title: Lab Course –I (Based on DSC-I)

Course Code: 101PHY1103

Credits: 01

Max. Marks: 50

Hours: 30

Learning Objectives

LO 1. Learning by doing' is the experimental work,

LO 2. To expose U.G. Students to the techniques of handling simple instruments and also make use of them in determining certain mechanical and thermal properties of matter.

Course outcomes

After completion of course the student will be able to-

CO 1. Determine acceleration due to gravity of earth,

CO 2. Determine elastic properties (Young's modulus and Modulus of rigidity) of material

CO 3. Determine and know the properties of liquid like Viscosity, Surface tension,

CO 4. Determine thermal conductivity of bad conductor.

| Practical No. | Unit |
|---------------|---|
| 1 | Determination of acceleration due to gravity by bar pendulum. |
| 2 | Y - by Flat Spiral Spring. |
| 3 | Determination of η by Static torsion method. |
| 4 | Viscosity of liquid by Poiseuille's method. |
| 5 | Surface tension of liquid by Jaeger's method. |
| 6 | Y-by bending of beam loaded at middle. |
| 7 | Angle of the prism using Spectrometer |
| 8 | Thermal conductivity of a bad conductor by Lee's disc method. |
| 9 | Calibration of Spectrometer. |
| 10 | ' η ' by Maxwell's needle |
| 11 | Surface tension by Ferguson's method. |

N.B.: At least six experiments should be performed from above.



Rajarshi Shahu Mahavidyalaya, Latur

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Department of Physics

Course Type: DSC-II

Course Title: Heat and Thermodynamics-II

Course Code: 101PHY1102

Credits: 03

Max. Marks: 75

Lectures: 45 Hrs.

Learning Objectives

- LO 1. Develop understanding of nature of heat transfer; transport Phenomena in gases, behavior of gases at different temperatures.
- LO 2. Create awareness among students about laws of Thermodynamics,
- LO 3. Familiarize students about entropy, heat engines, refrigerators, etc;
- LO 4. Adapting the gained knowledge about thermodynamic system using thermodynamic potentials.

Course outcomes

After completion of course the student will be able to-

- CO 1. Know the Zeroth law, First Law, Second law and Third law of Thermodynamics.
- CO 2. Define heat, work, efficiency and the difference between various forms of energy.
- CO 3. Explain entropy changes of the thermodynamic system.
- CO 4. Describe energy exchange processes.

| Unit No. | Title of Unit & Contents | Hrs. |
|----------|--|-----------|
| I | Transport Phenomena in Gases | 11 |
| | <ol style="list-style-type: none">1. Introduction to Thermodynamics,2. Molecular Collision, mean free path, sphere of influence, Collision cross-section,3. Expression for mean free path, Maxwell's Formula, three transport phenomena in gases,4. Viscosity, Effect of Temperature and Pressure on Coefficient of Viscosity,5. Thermal conductivity and self-diffusion of gases,6. Effect of temperature and pressure on mean free path,7. Relation between Coefficient of Viscosity and Thermal Conductivity,8. Relation between three transport coefficients, Numerical problems. | |
| | Unit Outcome: UO 1. State the nature of heat transfer, transport phenomena in gases, behavior of various gases at different temperatures. | |

| Unit No. | Title of Unit & Contents | Hrs. |
|------------|---|-----------|
| II | Behavior of Real Gases | 11 |
| | 1. Introduction, change of state, continuity of state, 2. Andrew's experiment on CO ₂ , 3. Critical Constants, behavior of gases at high pressure, Boyle's temperature, 4. Reasons for Modification of gas equation, Vander Wall's equation of state, Comparison of experimental P-V curves, estimation of critical constants, Constants for Vander walls equation, 5. Critical coefficients, reduced equation of state, 6. Joule-Thomson Porous Plug experiment, 7. Relation between the Boyle temperature, Inversion temperature and critical temperature, 8. Relation between TB, Ti and T _C , Numerical problems. | |
| | Unit Outcome: UO 1. Learn about the real gas equations, Van der Waal equation of state, the Joule- Thompson effect. | |
| III | Thermodynamics | 12 |
| | 1. Introduction, zeroth law of thermodynamics, Concept of Heat, 2. Thermodynamic equilibrium, Work: a) A path Dependent function, b) Internal energy, first law of thermodynamics, 3. Internal energy as a state function, Specific heats of a gas, slopes of Adiabatic and Isothermal, Reversible and Irreversible process, 3. Second law of thermodynamics, Work done during adiabatic and isothermal process, 4. Carnot's ideal heat engine and the efficiency of Carnot's cycle, Carnot's theorem and it's proof, refrigerator, 5. Entropy, entropy of reversible and irreversible process, third law of thermodynamics, 6. Numerical problems. | |
| | Unit Outcome: UO 1. Comprehend the basic Comprehend the basic concepts of thermodynamics, the first and the second law of thermodynamics, zeroth law of thermodynamics, the concept of entropy and the associated theorems. | |
| IV | Thermodynamical Relations | 11 |
| | 1. Introduction, Extensive and Intensive variables, 2. Maxwell's thermodynamical relations, 3. Applications of thermodynamical relations: a) Specific heat equation b) Joule-Thomson's cooling, 4. T-dS equations, Claussius-Clapeyron's latent heat equation using | |

| Unit No. | Title of Unit & Contents | Hrs. |
|----------|---|------|
| | thermodynamical relations, 5. Internal energy, Helmholtz's function, enthalpy, Gibb's function. | |
| | Unit Outcome: UO 1. Learn about Maxwell's thermodynamic relations. UO 2. Comprehend the thermodynamic potentials and their physical interpretations. | |

Learning Resources:

1. Heat, Thermodynamics and Statistical Physics- Brijlal, Dr. N. Subrahmanyam, P. S. Hemne, S. Chand and Co. Ltd.
2. Heat, Thermodynamics & Statistical Physics, S.L. Kakani, Sultan Chand & Sons. Publishing (2009) Revised Edition
3. Heat and Thermodynamics -Brijlal, N. Subrahmanyam, S. Chand and Co. Ltd.
4. Textbook of Heat and thermodynamics- D. S. Mathur.
5. Thermal and Statistical Physics- Brijlal & N. Subrahmanyam, S. Chand and Co. Ltd.
6. Thermal Physics: with Kinetic Theory, Thermodynamics and Statistical Mechanics, S.C. Garg, R.M. Bansal, C.K. Ghosh Tata Mcgraw Hill Education Private Limited (2017) Second Edition.
7. Engineering Thermodynamics, P.K. Nag (Publisher: McGraw-Hill Education)
8. A Textbook of Thermal Physics, R.K. Rajput (Publisher: S. Chand Publishing)
9. Introduction to Thermodynamics, Y.V.C. Rao (Publisher: Universities Press)
10. Thermodynamics and Statistical Physics, B.B. Laud (Publisher: New Age International Publishers)



Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Physics

Course Type: Lab Course

Course Title: Lab Course –II (Based on DSC-II)

Course Code: 101PHY1104

Credits: 01

Max. Marks: 50

Hours: 30

Learning Objectives

- LO 1. Learning by doing' is the experimental work,
LO 2. To expose Students to the techniques of handling simple instruments and also make use of them in determining certain thermal properties of matter.

Course outcomes

After completion of course the student will be able to-

- CO 1. Determine Mechanical Equivalent of Heat
CO 2. Measure the Planck's constant
CO 3. Determine the coefficient of thermal conductivity
CO 4. Calibrate the given thermocouple.

| Practical No. | Unit |
|---------------|--|
| 1 | Determination of thermal conductivity of bad conductor by Lee's disc method |
| 2 | Determination of thermal conductivity by Forbes method |
| 3 | To determine the coefficient of thermal conductivity of copper by Searle's Apparatus. |
| 4 | To determine the temperature co-efficient of resistance by Platinum resistance thermometer. |
| 5 | To study the variation of thermos emf across two junctions of a thermocouple with temperature. |
| 6 | Thermal conductivity of rubber tube |
| 7 | To record the analyze the cooling temperature of a hot object as a function of time using a thermocouple |
| 8 | Coefficient of Viscosity by Searle's viscometer at particular temperature |
| 9 | To determine Mechanical Equivalent of Heat |
| 10 | Measurement of Planck's constant |

N.B.: At least six experiments should be performed from above.



Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Physics

Course Type: VSC-I

Course Title: Domestic Electrical Wiring

Course Code: 101PHY1501

Credits: 02

Max. Marks: 50

Lectures: 30 Hrs.

Learning Objectives:

- LO 1. To provide knowledge about the electrical gadgets and their working principles.
- LO 2. To introduce about the electrical wiring systems at domestic and household appliances.
- LO 3. To provide hand on experiments for electrical installations, maintenance and wiring repairs.

Course Outcomes:

After completion of course the student will be able to-

- CO 1. Gain knowledge of various electrical gadget installations at domestic levels.
- CO 2. Understand wiring systems and electrical connections of different phases at household appliances.
- CO 3. Perform electrical installations, maintenance and wiring repairs.
- CO 4. Take assignments of domestic electrical wirings and their by it may generate the employment for them.

| Unit No. | Title of Unit & Contents | Hrs. |
|-----------|---|----------|
| I | Study & Use of Wiring Accessories | 6 |
| | 1. P.V.C wire, Grade of wire, Size of wire, 2. Main switch (ICDP, ICTP&N), Solid & Stranded conductor, Single pole & Double pole switch, 3. Different types of switches, Miniature circuit breaker (M.C.B) 4. Different types of fuses, Cut-out, Fuse-grip, Ceiling rose, Lamp holder, Different types of plug, 5 Live wire, Neutral wire, Earth wire, Switchboard, Various symbols associated with various components of wiring. | |
| | Unit Outcomes: UO 1. Apply knowledge for the household or industrial wiring and what materials are essential for household or industrial wiring. UO 2. Study of different types of switches, wiring and how it is done. | |
| II | Testing of Electrical Installation | 5 |
| | 1. Continuity test of wiring, Continuity test of conduit, | |

| | | |
|------------|---|----------|
| | <p>2. Polarity test of single pole switch by test lamp, Polarity test of single pole switch, Earth continuity test,</p> <p>3. Insulation resistance test between conductors, Insulation resistance test between conductor and earth by Megger,</p> <p>4. Study the necessary I.E. rules for domestic wiring and earthing.</p> <p>Unit Outcomes: UO 1. Identify operations of wiring as continuity, UO 2. Testing of Polarity, Analysis of Single phase AC circuits, Representation of alternating quantities and examine the power in circuits.</p> | |
| III | To make Domestic Wiring | 5 |
| | <p>1. To make a wiring circuit using PVC wire and Conduit for one Lamp point,</p> <p>2. One Fan point with regulator and one 3-pin plug point.</p> <p>3. The wiring includes Main switch & Switchboard.</p> <p>4. Prepare a chart for listing of the materials used with their specification and symbols.</p> <p>Unit Outcome: UO 1. Use appropriate electrician tools, wires, protective devices and wiring accessories. UO 2. Prepare different types of wiring joints.</p> | |
| IV | Application of different types of switch connections | 6 |
| | <p>1. Control of a light/fan point using one switch,</p> <p>2. Control of a light point from two different places, Control of a light point from more than two different places,</p> <p>3. Switching of two or more lamps by a single switch,</p> <p>4. Connection of bed switch, Series & Parallel connection of lamps.</p> <p>Unit Outcomes: UO 1. Rig up a circuit to control one lamp from two place using two way switches. UO 2. Rig up calling bell circuit with indicator to operate from three different places using push button switches.</p> | |
| V | Practicals (Included in above 04 units) | 8 |
| | <p>1. To determine Gauge, Size of wire, grade of wire and Size of PVC pipe.</p> <p>2. To determine Live wire, Neutral wire, Earth wire</p> <p>3. To use appropriate electrician tools, wires, protective devices and wiring accessories.</p> <p>4. To make Fan point with regulator</p> <p>5. Make 3-pin plug point.</p> <p>6. Control of a light/fan point using one switch,</p> | |

| | | |
|--|---|--|
| | 7. The wiring of Main switch & Switchboard 8. Control of a light point from two different places | |
|--|---|--|

Learning Resources:

1. Electrical Installation Estimating & Costing – J.B. Gupta – S.K. Kataria Publication.
2. Electrical Installation Estimating & Costing – S. Singh – Dhanpat Rai Publication.
3. Basic Electrical Engineering (Vol-I) – P.S. Dhogal, S.K. Mandal – Tata McGraw Hill Publication.
4. Electric Wiring – S. Samaddar – New Central Book Agency (P) Ltd.
5. Electrical Installation: Estimating and Costing, S.L. Uppal (Publisher: Khanna Publishers)
6. Electrical Wiring: Residential and Commercial, Sunita Halder (Publisher: Satya Prakashan)
7. Electrical Installation and Wiring, Sudhir Choudhary (Publisher: Firewall Media)
8. Domestic Wiring: Design, Installation, and Maintenance, S.K. Mandal (Publisher: S. Chand Publishing)
9. A Course in Electrical Installation Estimating and Costing, J.B. Gupta (Publisher: S.K. Kataria & Sons)
10. Domestic and Industrial Electrical Wiring, H.P. Garg (Publisher: Khanna Publishers)
11. Domestic Electric Wiring" by R.P. Singh (Publisher: Firewall Media)



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UG First Year

Basket I: Generic/Open Elective (GE/OE)

(GEs offered to the Science & Technology students in Sem.-I)

| Sr. No. | BoS Proposing GE/OE | Code | Course Title | Credits | Hrs. |
|---------|---------------------|------------|--------------------------------------|---------|------|
| 1 | Commerce | 101AAF1401 | Mutual Fund Management | 04 | 60 |
| 2 | Commerce | 101MAE1401 | Fundamentals of Statistics | 04 | 60 |
| 3 | English | 101ENG1402 | English for Science and Technology | 04 | 60 |
| 4 | Geography | 101GEO1401 | General Geography | 04 | 60 |
| 5 | Commerce | 101BAI1401 | Personal Financial Management | 04 | 60 |
| 6 | Marathi | 101MAR1401 | स्पर्धा परीक्षा आणि मराठी भाषा | 04 | 60 |
| 7 | Political Science | 101POL1401 | Human Rights | 04 | 60 |
| 8 | Biotechnology | 101BIO1401 | Nutrition, Health and Hygiene | 04 | 60 |
| 9 | Music | 101MUS1401 | Indian Vocal Classical & Light Music | 04 | 60 |
| 10 | NCC Studies | 101NCC1401 | Introduction to NCC | 04 | 60 |
| 11 | Sports | 101SPO1401 | Counseling and Psychotherapy | 04 | 60 |

Note: Student can choose any one GE from the basket.



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Basket II: Skill Enhancement Courses (SEC)

(SEC offered to the Science & Technology students in Sem.-I)

| Sr. No. | BoS Proposing SEC | Code | Course Title | Credits | Hrs. |
|---------|------------------------|------------|---------------------------------|---------|-------|
| 1 | Chemistry | 101CHE1601 | Pesticides and Green Chemistry | 02 | 30-45 |
| 2 | Information Technology | 101COM1601 | Basics of Python Programming | 02 | 30-45 |
| 3 | Physics | 101PHY1601 | Physics Workshop Skills | 02 | 30-45 |
| 4 | Biotechnology | 101BIO1601 | Food Processing Technology | 02 | 30-45 |
| 5 | Botany | 101BOT1601 | Mushroom Cultivation Technology | 02 | 30-45 |
| 6 | English | 101ENG1601 | Proof Reading and Editing | 02 | 30 |
| 7 | Information Technology | 101COA1601 | PC Assemble and Installation | 02 | 30-45 |
| 8 | Marathi | 101MAR1601 | कथा/पटकथालेखन | 02 | 30 |
| 9 | Zoology | 101ZOO1601 | Bee Keeping | 02 | 30-45 |

Note: Student can choose any one SEC from the basket.



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Basket III: Ability Enhancement Courses (AEC)

(AEC offered to the Science & Technology students in Sem.-I)

| Sr. No. | BoS Proposing AEC | Code | Course Title | Credits | Hrs. |
|---------|-------------------|------------|-----------------------------------|---------|------|
| 1 | Marathi | 101MAR7101 | भाषिक कौशल्य भाग - १ | 02 | 30 |
| 2 | Hindi | 101HIN7101 | हिंदी भाषा शिक्षण भाग - १ | 02 | 30 |
| 3 | Sanskrit | 101SAN7101 | व्यावहारीक व्याकरण व नितिसुभाषिते | 02 | 30 |
| 4 | Pali | 101PAL7101 | उपयोजित व्याकरण | 02 | 30 |

Note: Student can choose any one AEC from the basket.



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Extra Credit Activities

| Sr. No. | Course Title | Course Code | Credits | Hours T/P |
|---------|----------------------------|-------------|--------------------|-----------------|
| 1 | MOOCs | | Min. of 02 credits | Min. of 30 Hrs. |
| 2 | Certificate Courses | | Min. of 02 credits | Min. of 30 Hrs. |
| 3 | IIT Spoken English Courses | | Min. of 02 credits | Min. of 30 Hrs. |

Guidelines:

Extra -academic activities

1. All extra credits claimed under this heading will require sufficient academic input/contribution from the students concerned.
2. Maximum 04 extra credits in each academic year will be allotted.
3. These extra academic activity credits will not be considered for calculation of SGPA/CGPA but will be indicated on the grade card.

Additional Credits for Online Courses:

1. Courses only from SWAYAM and NPTEL platform are eligible for claiming credits.
2. Students should get the consent from the concerned subject Teacher/Mentor/Vice Principal and Principal prior to starting of the course.
3. Students who complete such online courses for additional credits will be examined/verified by the concerned mentor/internal faculty member before awarding credits.
4. Credit allotted to the course by SWAYAM and NPTEL platform will be considered as it is.

Additional Credits for Other Academic Activities:

1. One credit for presentation and publication of paper in International/National/State level seminars/workshops.
2. One credit for measurable research work undertaken and field trips amounting to 30 hours of recorded work.
3. One credit for creating models in sponsored exhibitions/other exhibits, which are approved by the concerned department.
4. One credit for any voluntary social service/Nation building exercise which is in collaboration with the outreach center, equivalent to 30 hours
5. All these credits must be approved by the College Committee.

Additional Credits for Certificate Courses:

1. Students can get additional credits (number of credits will depend on the course duration) from certificate courses offered by the college.
2. The student must successfully complete the course. These credits must be approved by the Course Coordinators.
3. Students who undertake summer projects/ internships/ training in institutions of repute through a national selection process, will get 2 credits for each such activity. This must be done under the supervision of the concerned faculty/mentor.

Note:

1. The respective documents should be submitted within 10 days after completion of Semester End Examination.
2. No credits can be granted for organizing or for serving as office bearers/ volunteers for Inter-Class / Associations / Sports / Social Service activities.
3. The office bearers and volunteers may be given a letter of appreciation by the respective staff coordinators. Besides, no credits can be claimed for any services/activities conducted or attended within the college.
4. All claims for the credits by the students should be made and approved by the mentor in the same academic year of completing the activity.
5. Any grievances of denial/rejection of credits should be addressed to Additional Credits Coordinator in the same academic year.
6. Students having a shortage of additional credits at the end of the third year can meet the Additional Credits Coordinator, who will provide the right advice on the activities that can help them earn credits required for graduation.



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Examination Framework

Theory:

40% Continuous Assessment Tests (CATs) and 60% Semester End Examination (SEE)

Practical:

50% Continuous Assessment Tests (CATs) and 50% Semester End Examination (SEE)

| Course | Marks | CAT & Mid Term Theory | | | | CAT Practical | | Best Scored CAT & Mid Term | SEE | Total |
|------------------------|-------|-----------------------|-------|----------|--------|---------------|-----|----------------------------|-----|-------|
| | | 3 | | | | 4 | | | | |
| 1 | 2 | Att . | CAT I | Mid Term | CAT II | Att. | CAT | 5 | 6 | 5 + 6 |
| DSC/DSE/GE/OE/Minor | 100 | 10 | 10 | 20 | 10 | - | - | 40 | 60 | 100 |
| DSC | 75 | 05 | 10 | 15 | 10 | - | - | 30 | 45 | 75 |
| Lab Course/AIPC/OJT/FP | 50 | - | - | - | - | 05 | 20 | - | 25 | 50 |
| VSC/SEC/AEC/VEC/C | 50 | 05 | 05 | 10 | 05 | - | - | 20 | 30 | 50 |

Note:

1. All Internal Exams are compulsory
2. Out of 02 CATs best score will be considered
3. Mid Term Exam will be conducted by the Exam Section
4. Mid Term Exam is of Objective nature (MCQ)
5. Semester End Exam is of descriptive in nature (Long & Short Answer)
6. CAT Practical (20 Marks): Lab Journal (Record Book) 10 Marks, Overall Performance 10 Marks.