Bachelor of Science
B.Sc. Physics Semester I
(Syllabus effective from the Academic Year 2026-2027)

Course Code	UAS1MAPHY01	Title of the Course	Mechanics and Optics
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	1. To understand the theoretical concepts of material behaviour with particular emphasis on their elastic property. 2. To understand the basic concepts of types of waves with special reference to Ultrasonic waves and its applications. The unit also introduces understanding of oscillations with special emphasis on properties of simple harmonic motion observed in case studies of different types of pendulums. 3. In this course, students will be introduced to fundamental concepts of waves and classical optics with application to interference and diffraction. Also introduced various optical instruments and their resolving power. 4. To provide exposure to various properties of Laser, production techniques of Laser and its applications.

Course Content		
Unit	**Description**	**Weightage* (%)**
1.	**ELASTICITY:** Introduction, Definitions of Load, Stress and Strain, Hooke's Law & Stress-strain diagram, Three types of elasticity:(i) Young's modulus (ii) Bulk Modulus and (iii) Modulus of Rigidity, Work done per unit volume in elongation strain, Deformation of a cube- (Bulk modulus, Modulus of rigidity, Young modulus), Relation connecting the elastic constants, Poisson's ratio, Relation for K and η in terms of Poisson's ratio, Limiting values of σ, Determination of Poisson's ratio for rubber, Twisting couple on a cylinder (or wire), Torsional pendulum, Determination of η-Statical method (Horizontal twisting apparatus for a rod), Dynamical method (Maxwell's vibrating needle method), Bending of beams, Bending moment, The cantilever-when the weight of beam is ineffective, Depression of a beam supported at the ends- when the beam is loaded at the centre, Related Numerical	**25%**
2.	**ULTRASONIC WAVE AND OSCILLATIONS:** **Ultrasonic Wave:** Introduction to Ultrasonic waves, Production of ultrasonic waves (1) Magnetostriction method (2) Piezo-electric method, Detection of Ultrasonic, Properties of Ultrasonic, Wavelength of Ultrasonic waves, Applications of ultrasonic waves, Related Numerical **Oscillations:** Compound pendulum, Centre of oscillation, Interchangeability of centers of suspension and oscillation, Centre of percussion, Other points collinear with C.G. about which the time period is the same, Conditions for maximum and minimum time periods, Bar pendulum, Determination of k, Kater's reversible pendulum, Related Numerical	**25%**

3	**OPTICS:** **Interferometry:** Introduction to interference, Applications of phenomenon of interference (List only), Jamin's refractometer or interferometer, Rayleigh's refractometer, Michelson's interferometer, Types of fringes, white light fringes, Uses, Measurement of wavelength of light from a monochromatic source, Measurement of refractive index of a thin plate, Related Numerical **Resolving power of optical instruments:** Resolving power, Rayleigh's criterion; limit of resolution, limit of resolution of the eye, Resolving power Telescope, Resolving power of light microscope, Resolving power of a diffraction Grating, Resolving power of prism spectroscope, Related Numerical	**25%**
4	**LASER:** Introduction, Properties of LASER, Stimulated absorption, Spontaneous emission and Stimulated emission, Relation between Einstein's A and B coefficients, Population Inversion, Pumping, Main component of LASER, ND: YAG LASER, CO2 LASER, Application of LASER in material processing, Holography and Other application of Laser, Related Numerical	**25%**

Teaching-Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	Internal Written / Practical Examination	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	15%
3.	University Examination	70%

Course Outcomes: On the successful completion of the course, the students will be able to understand	
1	elastic nature of material, types of elastic modulus and different methods to determine elastic modulus.
2	principle, production, properties and uses of Ultrasonic waves. Determination of acceleration of gravity with different types of pendulums.
3	basic concepts of interference and its applications in various interferometry apparatus. How to derive resolving power of various optical instruments and how it can be modified.
4	the structure and properties of lasers, their performance and applications in engineering and medical fields.

Suggested References:	
Sr. No.	**References**
1.	Elements of Properties of Matter D S Matur S Chand & Co., New Delhi (Reprint 2018)
2.	Engineering Physics R K Gaur and S L Gupta Dhanpat Rai Publications (P) Ltd., New Delhi (Reprint 2016)
3.	A Textbook of Optics D N Vasudeva Atma Ram & Sons, Delhi (20th Edition)
4.	Engineering Physics K Rajagopal PHI Learning, New Delhi (Third Printing 2009)

On-line resources to be used if available as reference material
On-line Resources:
https://phys.libretexts.org/
http://hyperphysics.phy-astr.gsu.edu/
https://www.feynmanlectures.caltech.edu/II_38.html
https://nptel.ac.in/courses/115/106/115106119/
https://physicstoday.scitation.org/doi/10.1063/1.1580055
https://www.youtube.com/watch?v=UA1qG7Fjc2A
https://www.explainthatstuff.com/howinterferometerswork.html
https://ocw.mit.edu/resources/res-6-005-understanding-lasers-and-fiberoptics-spring- 2008/laser-fundamentals-i/ https://nptel.ac.in/courses/104/104/104104085/

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Bachelor of Science
B.Sc. Physics Practical Semester I
(Syllabus effective from the Academic Year 2026-2027)

Course Code	UAS1MAPHY02	Title of the Course	Physics Practical
Total Credits of the Course	04	Hours per Week	08

Course Objectives:	1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory. 2. To learn the usage of electrical and optical systems for various measurements. 3. Apply the analytical techniques and graphical analysis to the experimental data. 4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

Course Content	
Description	**Weightage (%)**
SECTION: A 1. Use of Vernier Calipers, Micrometer Screw Gauge, Travelling Microscope 2. 'η' by statical method 3. M.I. of Disc using Torsional pendulum 4. 'Y' by cantilever 5. Poisson's ratio for rubber 6. Melde's experiment [P/L = Constants] (A & B Position) 7. Determination of 'g' using Bar pendulum 8. Newton's Ring 9. 'λ' by spectral line 10. Resolving power of prism 11. Errors in observation	50%
SECTION: B 1. Various types of graph plotting 2. Frequency of A.C by Sonometer 3. Characteristics of PN junction diode (Forward & Reversed bias) 4. Half wave rectifier (Evaluation of A.C. components) 5. Full wave rectifier (Evaluation of A.C. components) 6. Vibration magnetometer (Determination of M_1 & M_2) 7. Zener diode characteristics 8. Study of Transformer 9. Decay of Capacitor 10. Least square fitting for given linear data	50%

Note:

[1] To provide flexibility, up to the maximum of **20%** of total experiments can be replaced/added by college to this list prepared by the Board of Studies.

[2] A minimum of **80%** experiments must be performed in practical course.

[3] To maintain uniformity in assessment of practical examination the below mentioned marks distribution pattern is followed:

Sr. No.	Work done	Weightage as per 100 Marks
1.	Writing Principle / Statement/ Formula with explanation of symbols and units	16 Marks
2.	Diagram/Circuit Diagram / Expected Graph	16 Marks
3.	Setting up of the experiment + Tabular Columns + taking readings	28 Marks
4.	Calculations (explicitly shown) + Graph	20 Marks
5.	Accuracy of results with units	08 Marks
6.	Round the year Performance/ Records (to be valued at the time of practical Examination through oral viva)	12 Marks
	Total	**100 Marks**

Note:

- Weightage of both the sections A and B are 50%. Students are required to obtain 40% of total marks.
- Wherever explicit setting up of experiments does not exist like in the case of spectral charts or pre–acquired data is involved, the marks for setting up of experiment may be provided for additional graphs and formulae.

Teaching- Learning Methodology	Direct Teaching through Demonstration, Chalk-Walk and Talk ICT enabled teaching Question-Answer Group discussion led by teacher/students Problem solving activities Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Viva voce Blended Learning designs

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: On the successful completion of the course, the students will be able to

1. Apply the various procedures and techniques for the experiments
2. Use different measuring devices and meters to record the data with precision
3. Apply the mathematical concepts/equations to obtain quantitative results
4. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

Suggested References:

Sr. No.	References
1.	Advanced Practical Physics for students B L Worsnop and H T Flint Methuen and Co. Ltd., London (1951)
2.	B.Sc. Practical Physics C L Arora S. Chand & Co. Ltd., New Delhi (2018)
3.	Advanced Practical Physics M S Chauhan and S P Singh Pragati Prakashan, Meerut (1984)
4.	Advanced Practical Physics S L Gupta and V Kumar Pragati Prakashan, Meerut (1998)
5.	B.Sc. Practical Physics Harnam Singh and Dr. P.S. Hemne S. Chand & Co. Ltd., New Delhi (2000)
6.	Practical Physics (4^{th} Edition) G. L. Squires Cambridge University Press (2014)
7.	An Advanced Course in Practical Physics D. Chatopdhyay, P.C. Rakshit New Central Book Agency Pvt. Ltd (1990)
8.	Practical Physics (With Viva-Voce) Dr. S L Gupta and V Kumar Pragati Prakashan, Meerut (2014)

On-line resources to be used if available as reference material

On-line Resources:

https://www.electronics-tutorials.ws/

https://www.electronicshub.org/tutorials/

www.allaboutcircuits.com

https://nptel.ac.in/courses/115/105/115105110

https://nptel.ac.in/courses/115/105/115105121

https://nptel.ac.in/courses/115/105/115105120

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Bachelor of Science
B.Sc. Physics Semester I
(Syllabus effective from the Academic Year 2026-2027)

Course Code	UAS1MIPHY01	Title of the Course	Optics and LASER applications
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	1. In this course, students will be introduced to fundamental concepts of waves and classical optics with application to interference and diffraction. Also introduced various optical instruments and their resolving power. 2. To provide exposure to various properties of Laser, production techniques of Laser and its applications.

Course Content		
Unit	**Description**	**Weightage* (%)**
1	**OPTICS:** **Interferometry:** Introduction to interference, Applications of phenomenon of interference (List only), Jamin's refractometer or interferometer, Rayleigh's refractometer, Michelson's interferometer, Types of fringes, white light fringes, Uses, Measurement of wavelength of light from a monochromatic source, Measurement of refractive index of a thin plate, Related Numerical **Resolving power of optical instruments:** Resolving power, Rayleigh's criterion; limit of resolution, limit of resolution of the eye, Resolving power Telescope, Resolving power of light microscope, Resolving power of a diffraction Grating, Resolving power of prism spectroscope, Related Numerical	**50%**
2	**LASER:** Introduction, Properties of LASER, Stimulated absorption, Spontaneous emission and Stimulated emission, Relation between Einstein's A and B coefficients, Population Inversion, Pumping, Main component of LASER, ND: YAG LASER, CO2 LASER, Application of LASER in material processing, Holography and Other application of Laser, Related Numerical	**50%**

Teaching-Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	Internal Written / Practical Examination	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	15%
3.	University Examination	70%

Course Outcomes: On the successful completion of the course, the students will be able to understand	
1	basic concepts of interference and its applications in various interferometry apparatus. How to derive resolving power of various optical instruments and how it can be modified.
2	the structure and properties of lasers, their performance and applications in engineering and medical fields.

Suggested References:	
Sr. No.	**References**
1.	A Textbook of Optics D N Vasudeva Atma Ram & Sons, Delhi (20th Edition)
2.	Engineering Physics K Rajagopal PHI Learning, New Delhi (Third Printing 2009)

On-line resources to be used if available as reference material
On-line Resources:
https://phys.libretexts.org/
https://www.youtube.com/watch?v=UA1qG7Fjc2A
https://www.explainthatstuff.com/howinterferometerswork.html
https://ocw.mit.edu/resources/res-6-005-understanding-lasers-and-fiberoptics-spring- 2008/laser-fundamentals-i/ https://nptel.ac.in/courses/104/104/104104085/

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Bachelor of Science
B.Sc. Physics Practical Semester I
(Syllabus effective from the Academic Year 2026-2027)

Course Code	UAS1MIPHY02	Title of the Course	Physics Practical
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory. 2. To learn the usage of electrical and optical systems for various measurements. 3. Apply the analytical techniques and graphical analysis to the experimental data. 4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

Course Content	
Description	**Weightage (%)**
1. Use of Vernier Calipers, Micrometer Screw Gauge, Traveling Microscope 2. Various types of graph plotting 3. Spectrometer: To determine the angle of prism 4. Study of Transformer 5. Errors in observation 6. Melde's experiment [P/L = Constants] (A & B Position) 7. Frequency of A.C by Sonometer 8. M.I. of Disc using Torsional pendulum 9. Vibration magnetometer (Determination of M_1 & M_2) 10. Poisson's ratio for rubber 11. Determination of 'g' using Bar pendulum 12. Characteristics of PN junction diode (Forward & Reversed bias) 13. Least square fitting for given linear data	100%

Note:

1. To provide flexibility, up to the maximum of **20%** of total experiments can be replaced/added by college to this list prepared by the Board of Studies.
2. A minimum of **80%** experiments must be performed in practical course.
3. To maintain uniformity in assessment of practical examination the below mentioned marks distribution pattern is followed:

Sr. No.	Work done	Weightage as per 50 Marks
1	Writing Principle / Statement/ Formula with explanation of symbols and units	08 Marks
2	Diagram/Circuit Diagram / Expected Graph	08 Marks
3	Setting up of the experiment + Tabular Columns + taking readings	14 Marks
4	Calculations (explicitly shown) + Graph	10 Marks
5	Accuracy of results with units	04 Marks
6	Round the year Performance/ Records (to be valued at the time of practical Examination through oral viva)	06 Marks
	Total for Practical	**50 Marks**
Note: Wherever explicit setting up of experiments does not exist like in the case of spectral charts or pre–acquired data is involved, the marks for setting up of experiment may be provided for additional graphs and formulae.		

Teaching- Learning Methodology	Direct Teaching through Demonstration, Chalk-Walk and Talk ICT enabled teaching Question-Answer Group discussion led by teacher/students Problem solving activities Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Viva voce Blended Learning designs

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	University Examination	100%

Course Outcomes: On the successful completion of the course, the students will be able to

1. Apply the various procedures and techniques for the experiments
2. Use different measuring devices and meters to record the data with precision
3. Apply the mathematical concepts/equations to obtain quantitative results
4. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

Suggested References:	
Sr. No.	References
1.	Advanced Practical Physics for students B L Worsnop and H T Flint Methuen and Co. Ltd., London (1951)
2.	B.Sc. Practical Physics C L Arora S. Chand & Co. Ltd., New Delhi (2018)
3.	Advanced Practical Physics M S Chauhan and S P Singh Pragati Prakashan, Meerut (1984)
4.	Advanced Practical Physics S L Gupta and V Kumar Pragati Prakashan, Meerut (1998)
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www.allaboutcircuits.com
https://nptel.ac.in/courses/115/105/115105110
https://nptel.ac.in/courses/115/105/115105121
https://nptel.ac.in/courses/115/105/115105120

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Bachelor of Science
B.Sc. Physics Semester I
(Syllabus effective from the Academic Year 2026-2027)

Course Code	UAS1IDPHY01	Title of the Course	LASER and Optical Instruments
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	1. To provide exposure to various properties of Laser, production techniques of Laser and its applications. 2. In this course, students will be introduced to fundamental concepts of waves and classical optics with application to interference and diffraction. Also introduced various optical instruments and their resolving power.

Course Content		
Unit	**Description**	**Weightage* (%)**
1.	**LASER:** Introduction, Properties of LASER, Stimulated absorption, Spontaneous emission and Stimulated emission, Relation between Einstein's A and B coefficients, Population Inversion, Pumping, Main component of LASER, ND: YAG LASER, CO2 LASER, Application of LASER in material processing, Holography and Other application of Laser	**50%**
2.	**OPTICS:** **Interferometry:** Introduction to interference, Applications of phenomenon of interference (List only), Jamin's refractometer or interferometer, Rayleigh's refractometer, Michelson's interferometer, Types of fringes, white light fringes, Uses, Measurement of wavelength of light from a monochromatic source, Measurement of refractive index of a thin plate **Resolving power of optical instruments:** Resolving power, Rayleigh's criterion; limit of resolution, limit of resolution of the eye, Resolving power Telescope, Resolving power of light microscope, Resolving power of a diffraction Grating, Resolving power of prism spectroscope	**50%**

Teaching-Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	Internal Written / Practical Examination	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	15%
3.	University Examination	70%

Course Outcomes: On the successful completion of the course, the students will be able to understand	
1	the structure and properties of lasers, their performance and applications in engineering and medical fields.
2	basic concepts of interference and its applications in various interferometry apparatus. How to derive resolving power of various optical instruments and how it can be modified.

Suggested References:	
Sr. No.	**References**
1.	Engineering Physics K Rajagopal PHI Learning, New Delhi (Third Printing 2009)
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On-line resources to be used if available as reference material
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https://phys.libretexts.org/
https://ocw.mit.edu/resources/res-6-005-understanding-lasers-and-fiberoptics-spring- 2008/laser-fundamentals-i/ https://nptel.ac.in/courses/104/104/104104085/
https://www.youtube.com/watch?v=UA1qG7Fjc2A
https://www.explainthatstuff.com/howinterferometerswork.html

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Vitthalbhai Patel & Rajratna P. T. Patel Science College
(Autonomous)
(Reaccredited with 'A' Grade by NAAC (CGPA 3.14)
Affiliated to SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat

Bachelor of Science
B.Sc. Physics Practical Semester I
(Syllabus effective from the Academic Year 2026-2027)

Course Code	UAS1IDPHY02	Title of the Course	Physics Practical
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory. 2. To learn the usage of electrical and optical systems for various measurements. 3. Apply the analytical techniques and graphical analysis to the experimental data. 4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

Course Content	
Description	**Weightage (%)**
1. Poisson's ratio for rubber 2. Frequency of A.C by Sonometer 3. Various types of graph plotting 4. Study of Transformer 5. M.I. of Disc using Torsional pendulum 6. Characteristics of PN junction diode (Forward & Reversed bias) 7. Errors in observation 8. Melde's experiment [P/L = Constants] (A & B Position) 9. Use of Vernier Calipers, Micrometer Screw Gauge, Traveling Microscope 10. Spectrometer: To determine the angle of prism 11. Vibration magnetometer (Determination of M_1 & M_2) 12. Determination of 'g' using Bar pendulum 13. Least square fitting for given linear data	100%

Note:

[1] To provide flexibility, up to the maximum of **20%** of total experiments can be replaced/added by college to this list prepared by the Board of Studies.

[2] A minimum of **80%** experiments must be performed in practical course.

[3] To maintain uniformity in assessment of practical examination the below mentioned marks distribution pattern is followed:

Sr. No.	Work done	Weightage as per 50 Marks
1	Writing Principle / Statement/ Formula with explanation of symbols and units	08 Marks
2	Diagram/Circuit Diagram / Expected Graph	08 Marks
3	Setting up of the experiment + Tabular Columns + taking readings	14 Marks
4	Calculations (explicitly shown) + Graph	10 Marks
5	Accuracy of results with units	04 Marks
6	Round the year Performance/ Records (to be valued at the time of practical Examination through oral viva)	06 Marks
	Total for Practical	50 Marks
Note: Wherever explicit setting up of experiments does not exist like in the case of spectral charts or pre–acquired data is involved, the marks for setting up of experiment may be provided for additional graphs and formulae.		

Teaching- Learning Methodology	Direct Teaching through Demonstration, Chalk-Walk and Talk ICT enabled teaching Question-Answer Group discussion led by teacher/students Problem solving activities Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Viva voce Blended Learning designs

Evaluation Pattern

Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: On the successful completion of the course, the students will be able to

[1] Apply the various procedures and techniques for the experiments
[2] Use different measuring devices and meters to record the data with precision
[3] Apply the mathematical concepts/equations to obtain quantitative results
[4] Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

Suggested References:

Sr. No.	References
1.	B.Sc. Practical Physics C L Arora S. Chand & Co. Ltd., New Delhi (2018)
2.	Advanced Practical Physics M S Chauhan and S P Singh Pragati Prakashan, Meerut (1984)
3.	Advanced Practical Physics S L Gupta and V Kumar Pragati Prakashan, Meerut (1998)
4.	B.Sc. Practical Physics Harnam Singh and Dr. P.S. Hemne S. Chand & Co. Ltd., New Delhi (2000)
5.	Practical Physics (4^{th} Edition) G. L. Squires Cambridge University Press (2014)
6.	An Advanced Course in Practical Physics D. Chatopdhyay, P.C. Rakshit New Central Book Agency Pvt. Ltd (1990)
7.	Practical Physics (With Viva-Voce) Dr. S L Gupta and V Kumar Pragati Prakashan, Meerut (2014)

On-line resources to be used if available as reference material
On-line Resources:
https://www.electronics-tutorials.ws/
https://www.electronicshub.org/tutorials/
www.allaboutcircuits.com
https://nptel.ac.in/courses/115/105/115105110
https://nptel.ac.in/courses/115/105/115105121
https://nptel.ac.in/courses/115/105/115105120

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Bachelor of Science
B.Sc. Physics Semester I
(Syllabus effective from the Academic Year 2026-2027)

Course Code	UAS1SEPHY01	Title of the Course	Electrical and Electronic components and measurement-I
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	1. To acquire basic understanding of electrical and electronic passive components. 2. To develop fundamental knowledge of electronic component measurement. 3. To understand behaviour of electrical and electronic circuits.

Course Content		
Unit	**Description**	**Weightage* (%)**
1.	**Passive components:** **Wires and solder:** Basics of wire, insulation, wire sizes, color-coding of wires, cables, types of solder. **Resistors:** The Ohm, Ohm's law, Resistor characteristics, The resistor color code, Combining resistors, Carbon resistors, Metal-film resistors, Wire wound resistors, Rheostats, Potentiometers.	**50%**
2.	**Passive components:** **Capacitors:** How capacitance work, The farad, Capacitive reactance, RC time constant, capacitor markings, classification of capacitors, **Coils and transformers:** The electromagnetic effect, what is inductance, Inductive reactance, combining inductances, Coefficient of coupling, Transformer action, center taps, autotransformers.	**50%**

Teaching-Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping Hands on training

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	University Examination	100%

Course Outcomes: On the successful completion of the course, the students will be able to understand	
1	Proper selection and use of different wires for the electrical and electronic circuits.
2	construction and working of electrical components like resistors, capacitors, coils and transformers.
3	measurement of various passive components used in advanced electrical and electronic circuits.

Suggested References:	
Sr. No.	**References**
1.	Basic electronic components Vishwajit K. Barbudhe, Shraddha Zanjat and Bhavana S. Karmore, Notion Press, 2020
2.	Electronic components A complete reference for project builders Delton T. Horn, TAB books, Division of McGraw-Hill Inc.
3.	Basic Electronics & Linear Circuits Bhargava & Gupta, McGraw Hill Education, New Delhi.
4.	A text book of Electrical Technology B. L. Theraja, S. Chand Publication.
5.	Basic electronics V.K. Mehta, S. Chand Publication.

On-line resources to be used if available as reference material
On-line Resources:
http://www.animations.physics.unsw.edu.au//jw/AC.html
https://en.wikipedia.org/wiki/Electronic_component
https://www.allaboutcircuits.com/
https://learn.adafruit.com/

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Bachelor of Science
B.Sc. Physics Semester I
(Syllabus effective from the Academic Year 2026-2027)

Course Code	UAS1SEPHY02	Title of the Course	Experimental skills in Physics
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	1. The aim of this course is to enable the students to gain familiarity and experience with various electrical, electronic and optical tools. 2. To understand the basic concept of electricity and electronics. 3. Gain the knowledge of various phenomena using hands-on experiments.

Description	Weightage (%)
1. Analog voltmeters and ammeters in a simple electrical circuit to measure voltage and current. [To use a Multimeter for measuring (a) Resistances (b) AC and DC Voltages, (c) DC Current and (d) checking electrical fuses] 2. Digital panel meters in electrical circuits for current and voltage measurement. 3. I-V characteristics of semiconductor diode. (Theoretical) 4. Study of digital number system 5. Study of Boolean algebra and verification of de-Morgan's theorem. 6. Damping coefficient of simple pendulum. 7. Divergence properties of ordinary and laser light. 8. Measurement of errors for vernier calipers and micrometer screw gauge. 9. Forward bias characteristics of a PN junction diode. 10. Study of travelling microscope.	100 %

Note:

1. To provide flexibility, up to the maximum of 20% of total experiments can be replaced/added by college to this list prepared by the Board of Studies.
2. A minimum of 80% experiments must be performed in practical course.
3. To maintain uniformity in assessment of practical examination the below mentioned marks distribution pattern is followed:

Sr. No.	Work done	Weightage as per 100 Marks
1.	Writing Principle / Statement/ Formula with explanation of symbols and units	16 Marks
2.	Diagram/Circuit Diagram / Expected Graph	16 Marks
3.	Setting up of the experiment + Tabular Columns + taking readings	28 Marks
4.	Calculations (explicitly shown) + Graph	20 Marks
5.	Accuracy of results with units	08 Marks
6.	Round the year Performance/ Records (to be valued at the time of practical Examination through oral viva)	12 Marks
	Total	**100 Marks**

Teaching Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs

Evaluation Pattern:		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	University Examination	100%

Course Outcomes: On the successful completion of the course, the students will be able to

1. Apply the various procedures and techniques for the experiments.
2. Use different measuring devices and meters to record the data with precision.
3. Apply the mathematical concepts/equations to obtain quantitative results.
4. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

Suggested References	
Sr. No.	References
1.	B.Sc. Practical Physics C L Arora S. Chand & Co. Ltd., New Delhi (2018)
2.	A text book in Electrical Technology B L Theraja, S. Chand & Co. Ltd., New Delhi
3.	Electronic Devices and Circuits S. Salivahanan & N. S.Kumar Tata Mcgraw Hill
4.	Electrical Measurements and Measuring Instruments R.K. Rajput, S. Chand & Co. Ltd., New Delhi
5.	Basic Electronics J.B. Gupta, S.K. Kataria & Sons

On-line resources to be used if available as reference material
On-line Resources:
https://www.electronics-tutorials.ws/
https://www.electronicshub.org/tutorials/
http://www.allaboutcircuits.com/
https://nptel.ac.in/courses/115/105/115105110

Vitthalbhai Patel & Rajratna P. T. Patel Science College
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UNIVERSITY Vallabh Vidyanagar, Gujarat
Syllabus effective from the Academic Year 2024-2025

Bachelor of Science
B.Sc. Physics Semester I
(Syllabus effective from the Academic Year 2026-2027)

Course Code	**UAS1IKBSC11**	**Title of the Course**	**Indian Astronomy**
Total Credits of the Course	**02**	**Hours per Week**	**02**

Course Objectives:	To create an awareness about Indian Astronomy to the students and also make them understand the basic concepts, technicalities and computational procedures developed by great Indian Astronomers and Mathematicians.

Course Content		
Unit	**Description**	**Weightage* (%)**
1	**ANCIENT INDIAN ASTRONOMY:** **Historical Introduction** Introduction, Ancient Indian Astronomy, The Vedic Period and Vedangajyotisa, Siddhanta, Contents of the Siddhantas, Continuity in Astronomical Tradition. **Celestial Sphere** Introduction, Diurnal Motion of Celestial Bodies, Motion of Celestial Bodies Relative to Stars, Celestial Horizon, Meridian, Polar Star and Directions, Zodiac and Constellations, Equator and Poles, Latitude of a place and Altitude of Polar Star, Ecliptic and the Equinoxes.	**50%**
2	**CO-ORDINATE SYSTEMS:** **Co-ordinate Systems** Introduction, Ecliptic System, Equatorial System, Horizontal System, Meridian System, Phenomenon of Precession of Equinoxes, Ancient Indian References to the Precession, Effects of Precession on Celestial Longitude, Tropical and Sidereal Longitudes. **Rasi and Naksatra Systems** Zodiac, Rasis and Naksatra Systems	**50%**

Teaching-Learning Methodology	Direct Teaching through Chalk-Walk and Talk ICT enabled teaching Question-Answer Class discussion led by teacher/students Case Studies Literature review Problem solving activities Debate Collaborative and Co-operative Learning Think Pair Share Jigsaw Inquiry Based Learning Panel Discussion Project Based Learning Flipped Classroom Blended Learning designs Concept Mapping

Internal and/or External Examination Evaluation (Theory Examination)

Sr. No.		Details of the Evaluation	Weightage
1.	Continuous and Comprehensive Evaluation	● Class test/Internal Written test (30%) ● Quiz (30%) ● Active learning (10%) ● Home Assignments (10%) ● Class Assignments (10%) ● Attendance (10%)	50 %
2.	Semester End Examination	● Written Test 50 %	50 %

Course Outcomes: On the successful completion of the course, the students will be able to understand	
1	Understanding of the development of astronomy from Vedic times to the recent times
2	Understanding the basic concepts of celestial sphere the different coordinate system
3	Learning the concepts of Celestial longitude and latitude, Right ascension, azimuth, altitude and equinox
4	Knowledge about the Zodiac systems

Suggested References:	
Sr. No.	**References**
1.	Indian astronomy: An introduction S. Balachandra Rao, Distributed by Orient Longman Ltd, 2000.
2.	The Story of Astronomy in India Chander Mohan, 2015.
3.	Indian Astronomy, A Sourcebook, B. V. Subbarayappa, K. V. Sarm

On-line resources to be used if available as reference material
On-line Resources:
https://www.astronomy.org.gg/more/resources/education/TheCelestialSphere.pdf
http://burro.case.edu/Academics/Astr306/Lectures/Coordinates.pdf
https://vigyanprasar.gov.in/wp-content/uploads/vp-Astronomy-in-India.pdf
https://explorable.com/indian-astronomy

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