Bachelor of Science
B.Sc. Physics Semester II

Course Code	**US02MAPHY01**	**Title of the Course**	**Vector Algebra, Relativity, Network Analysis and Basic Electronics**
Total Credits of the Course	**04**	**Hours per Week**	**04**

Course Objectives:	1. To apply geometric and algebraic properties of vectors to compute scalar and vector product, to find divergence and curl of vector function. 2. To study the fundamental concepts of special theory of relativity and the effect of relative motion on observations. 3. To understand simplification of complex electrical networks and use of bridge circuits to for the measurements of Resistance Capacitance Inductance and Frequency. 4. To understand the basics of semiconductor and components like diode and transistor.

Course Content		
Unit	**Description**	**Weightage* (%)**
1.	**VECTOR ALGEBRA:** Introduction to scalar and vector, Surface area as a vector, Scalar triple product, Reciprocal vectors, Vector triple product, Pseudo vectors and Pseudoscalars, Gradient of a scalar point function, Divergence of a vector, Equation of continuity, Curl of a vector point function, Irrotational and solenoidal vectors, Gauss' Theorem, Stokes' Theorem, Related Numerical [R G Takwale & P S Puranik: 1.1, 1.2, 1.3, 1.4, 1.8, 1.11, 1.12, 1.13, 1.16, 2.5, 2.6, 2.7, 2.8, 2.12, 2.14, 2.17]	**25%**
2.	**SPECIAL THEORY OF RELATIVITY:** Introduction, Frame of reference, Galilean transformation equation, Michelson Morley experiment, Einstein theory of relativity, Lorentz transformation of space and time, Length contraction, Explanation of negative results, Time dilation, Experimental verification of time dilation, Addition of velocities, Variation of mass with velocity, Equivalence of mass and energy, Related Numerical [R.K. Gaur and S.L. Gupta: 64.1,64.2, 64.3, 64.4, 64.5, 64.6, 64.7, 64.8, 64.9, 64.10, 64.11, 64.12, 64.13]	**25%**

3.	**NETWORK ANALYSIS AND BRIDGE CIRCUITS ELEMENTARY NETWORK THEORY:** Voltage divider rule, Superposition theorem, Network terminology, Network analysis by mesh currents (two & three mesh network), Circuit analysis by Node-pair voltages (one & two node pair voltage method), Thevenin's theorem, Norton's theorem Bridges and their application: AC bridges and their application, Condition for bridge balance, Application of the Balance equation, Maxwell bridge, Schering bridge, Wien bridge, Related Numerical [Del Toro 3.4, 3.5, 3.6, 3.7, 3.8, 3.9] [Cooper and Helfrick 5.5.1, 5.6, 5.7, 5.8,5.10]	**25%**
4.	**BASIC ELECTRONICS:** Use of diodes in rectifiers, Half wave rectifier, PIV, Output DC Voltage, Full wave rectifier: Centre tap rectifier, PIV, Bridge Rectifier, PIV, Output DC Voltage, Definition of ripple factor and rectification efficiency, Filters: Definition of filter, How to get better DC, Shunt capacitor filter, Series inductor filter, Diodes: Types of diodes, Signal diodes, Power diodes, Zener diode (Zener effect, Avalanche effect & Voltage regulation), Varactor diodes, Light emitting diodes Transistor: Introduction, Junction Transistor structure, Relations between different currents in a Transistor, DC Alpha, Three configurations, CE configuration (Input and output characteristics only), Related Numerical [N.N. Bhargava, D.C. Kulshreshtha and S.C. Gupta: 4.6, 4.6.1, 4.6.2, 4.7, 4.8, 4.8.1, 4.8.2, 4.9, 4.9.1, 4.9.3, 4.9.4, 4.9.5, 5.1, 5.2, 5.4.1, 5.4.2, 5.6, 5.7.2]	**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 (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: On the successful completion of the course, the students will be able to understand	
	dot product and cross product of vectors, gradient of a scalar function, divergence and curl of vector functions. Also the properties of gradient, divergence and curl.
	setup and significance of Michelson-Morley experiment, significance of the postulates of Special Theory of Relativity and relativistic motion.
	network techniques, like mesh analysis and node analysis, to write equations for complex linear electrical circuits. To apply Thevenin's and Norton theorems to analyse and design for maximum power transfer. Concepts of AC bridges and measurements of Capacitance, Inductance and Frequency.
	diode and transistor characteristics, various diode applications.

Suggested References:	
Sr. No.	**References**
1.	Introduction to Classical Mechanics R G Takwale & P S Puranik Tata McGraw-Hill Publishing Company Ltd., New Delhi (Reprint 2016)
2.	Engineering Physics R.K. Gaur and S.L. Gupta Dhanpat Rai Publications Ltd., New

	Delhi (2014)
3.	Principles of Electrical Engineering (2nd Edition) Vincent Del Toro PHI Learning Private Ltd. New Delhi (2010)
4.	Modern Electronic instrumentation and Measurement Techniques A D Helfrick and W D Cooper Pearson Education, Inc. (4th Edition)
5.	Basic Electronics and Linear Circuits N N Bhargava, DC Kulshreshtha and SC Gupta Tata McGraw-Hill Ltd., New Delhi (2nd Edition, 2018)

On-line resources to be used if available as reference material
On-line Resources:
https://math.libretexts.org/ https://www.cse.iitb.ac.in/~cs749/spr2017/handouts/jem_graddivcurl.pdf
https://www.space.com/36273-theory-special-relativity.htmlhttps://nptel.ac.in/courses/115/101/115101011/https://www.coursera.org/learn/einstein-relativity
https://www.allaboutcircuits.com/textbook/direct-current/chpt-10/what-is-network-analysis/ https://www.allaboutcircuits.com/textbook/alternating-current/chpt-12/ac-bridge-circuits/
https://www.electronics-tutorials.ws/ https://www.electronicshub.org/tutorials/ https://www.allaboutcircuits.com/textbook/semiconductors/chpt-3/rectifier-circuits/

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Bachelor of Science
B.Sc. Physics Practical Semester II

Course Code	US02MAPHY02	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. Flywheel 2. Y by bending of beam 3. M.I. of Irregular Body using Torsional pendulum 4. η by Maxwell's needle 5. Determination of 'k' using Bar pendulum 6. Resolving power of grating 7. Melde's experiment [T/L^2 = Constants] (A & B Position) 8. Determination of volume of parallelopiped, gradient of scalar function and divergence of vector point function 9. H by deflection magnetometer 10. Study of probability distribution for two option system (coins)	50%
SECTION: B 1. "L" by Maxwell's Bridge 2. Study of Thevenin's theorem 3. Measurement of self-inductance 4. Measurement of capacitance 5. To verify reciprocity theorem 6. Verification of Maximum power transfer theorem 7. Vibration magnetometer ((Determination of M_1 / M_2) 8. Half wave rectifier with filters (L & C) 9. Full wave rectifier with filters (L & C) 10. Zener diode as voltage regulator 11. Simulation of radioactive decay	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 ofsymbols 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
		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 foradditional 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 II

Course Code	**US02MIPHY01**	**Title of the Course**	**Network Theory, AC Bridges and Basic Electronics**
Total Credits of the Course	**02**	**Hours per Week**	**02**

Course Objectives:	1. To understand simplification of complex electrical networks and use of bridge circuits to for the measurements of Resistance Capacitance Inductance and Frequency. 2. To understand the basics of semiconductor and components like diode and transistor.

Course Content		
Unit	**Description**	**Weightage* (%)**
1.	**NETWORK ANALYSIS AND BRIDGE CIRCUITS ELEMENTARY NETWORK THEORY:** Voltage divider rule, Superposition theorem, Network terminology, Network analysis by mesh currents (two & three mesh network), Circuit analysis by Node-pair voltages (one & two node pair voltage method), Thevenin's theorem, Norton's theorem Bridges and their application: AC bridges and their application, Condition for bridge balance, Application of the Balance equation, Maxwell bridge, Schering bridge, Wien bridge, Related Numerical [Del Toro 3.4, 3.5, 3.6, 3.7, 3.8, 3.9] [Cooper and Helfrick 5.5.1, 5.6, 5.7, 5.8,5.10]	**50%**
2.	**BASIC ELECTRONICS:** Use of diodes in rectifiers, Half wave rectifier, PIV, Output DC Voltage, Full wave rectifier: Centre tap rectifier, PIV, Bridge Rectifier, PIV, Output DC Voltage, Definition of ripple factor and rectification efficiency, Filters: Definition of filter, How to get better DC, Shunt capacitor filter, Series inductor filter, Diodes: Types of diodes, Signal diodes, Power diodes, Zener diode (Zener effect, Avalanche effect & Voltage regulation), Varactor diodes, Light emitting diodes Transistor: Introduction, Junction Transistor structure, Relations between different currents in a Transistor, DC Alpha, Three configurations, CE	**50%**

	configuration (Input and output characteristics only), Related Numerical [N.N. Bhargava, D.C. Kulshreshtha and S.C. Gupta: 4.6, 4.6.1, 4.6.2, 4.7, 4.8, 4.8.1, 4.8.2, 4.9, 4.9.1, 4.9.3, 4.9.4, 4.9.5, 5.1, 5.2, 5.4.1, 5.4.2, 5.6, 5.7.2]	

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 (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: On the successful completion of the course, the students will be able to understand	
	network techniques, like mesh analysis and node analysis, to write equations for complex linear electrical circuits. To apply Thevenin's and Norton theorems to analyse and design for maximum power transfer. Concepts of AC bridges and measurements of

	Capacitance, Inductance and Frequency.
	diode and transistor characteristics, various diode applications.

Suggested References:	
Sr. No.	**References**
1.	Principles of Electrical Engineering (2nd Edition) Vincent Del Toro PHI Learning Private Ltd. New Delhi (2010)
2.	Modern Electronic instrumentation and Measurement Techniques A D Helfrick and W D Cooper Pearson Education, Inc. (4thEdition)
3.	Basic Electronics and Linear Circuits N N Bhargava, DC Kulshreshtha and SC Gupta Tata McGraw-Hill Ltd., New Delhi (2nd Edition, 2018)

On-line resources to be used if available as reference material
On-line Resources:
https://www.allaboutcircuits.com/textbook/direct-current/chpt-10/what-is-network-analysis/ https://www.allaboutcircuits.com/textbook/alternating-current/chpt-12/ac-bridge-circuits/
https://www.electronics-tutorials.ws/ https://www.electronicshub.org/tutorials/ https://www.allaboutcircuits.com/textbook/semiconductors/chpt-3/rectifier-circuits/

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Bachelor of Science
B.Sc. Physics Practical Semester II

Course Code	US02MIPHY02	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. Measurement of self-inductance 2. Measurement of capacitance 3. Vibration magnetometer ((Determination of M_1 / M_2) 4. Flywheel 5. Y by bending of beam 6. M.I. of Irregular Body using Torsional pendulum 7. Determination of 'k' using Bar pendulum 8. Melde's experiment [T/L^2 = Constants] (A & B Position) 9. Half wave rectifier with filters (L & C) 10. Full wave rectifier with filters (L & C) 11. Simulation of radioactive decay 12. Study of probability distribution for two option system (coins)	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)
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 II

Course Code	**US02IDPHY01**	**Title of the Course**	**Introductory electronics, network circuits and a.c. bridges**
Total Credits of the Course	**02**	**Hours per Week**	**02**

Course Objectives:	1. To understand simplification of complex electrical networks and use of bridge circuits to for the measurements of Resistance Capacitance Inductance and Frequency. 2. To understand the basics of semiconductor and components like diode and transistor.

Course Content		
Unit	**Description**	**Weightage* (%)**
1.	**INTRODUCTORY ELECTRONICS:** Use of diodes in rectifiers, Half wave rectifier, PIV, Output DC Voltage, Full wave rectifier: Centre tap rectifier, PIV, Bridge Rectifier, PIV, Output DC Voltage, Definition of ripple factor and rectification efficiency, Filters: Definition of filter, How to get better DC, Shunt capacitor filter, Series inductor filter, Diodes: Types of diodes, Signal diodes, Power diodes, Zener diode (Zener effect, Avalanche effect & Voltage regulation), Varactor diodes, Light emitting diodes Transistor: Introduction, Junction Transistor structure, Relations between different currents in a Transistor, DC Alpha, Three configurations [N.N. Bhargava, D.C. Kulshreshtha and S.C. Gupta: 4.6, 4.6.1, 4.6.2, 4.7, 4.8, 4.8.1, 4.8.2, 4.9, 4.9.1, 4.9.3, 4.9.4, 4.9.5, 5.1, 5.2, 5.4.1, 5.4.2, 5.6]	**50%**
2.	**NETWORK CIRCUITS AND BRIDGE CIRCUITS** Voltage divider rule, Superposition theorem, Network terminology, Network analysis by mesh currents (two & three mesh network), Circuit analysis by Node-pair voltages (one & two node pair voltage method), Thevenin's theorem, Norton's theorem Bridges and their application: AC bridges and their application, Condition for bridge balance, Application of the Balance equation, Maxwell bridge, Schering bridge, Wien bridge	**50%**

	[Del Toro 3.4, 3.5, 3.6, 3.7, 3.8, 3.9] [Cooper and Helfrick 5.5.1, 5.6, 5.7, 5.8,5.10]	

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 (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: On the successful completion of the course, the students will be able to understand	
	diode and transistor characteristics, various diode applications.
	network techniques, like mesh analysis and node analysis, to write equations for complex linear electrical circuits. To apply Thevenin's and Norton theorems to analyse and design for maximum power transfer. Concepts of AC bridges and measurements of Capacitance, Inductance and Frequency.

Suggested References:	
Sr. No.	**References**
1.	Basic Electronics and Linear Circuits N N Bhargava, DC Kulshreshtha and SC Gupta Tata McGraw-Hill Ltd., New Delhi (2nd Edition, 2018)
2.	Modern Electronic instrumentation and Measurement Techniques A D Helfrick and W D Cooper Pearson Education, Inc. (4thEdition)
3.	Principles of Electrical Engineering (2nd Edition) Vincent Del Toro PHI Learning Private Ltd. New Delhi (2010)

On-line resources to be used if available as reference material
On-line Resources:
https://www.electronics-tutorials.ws/ https://www.electronicshub.org/tutorials/ https://www.allaboutcircuits.com/textbook/semiconductors/chpt-3/rectifier-circuits/
https://www.allaboutcircuits.com/textbook/direct-current/chpt-10/what-is-network-analysis/ https://www.allaboutcircuits.com/textbook/alternating-current/chpt-12/ac-bridge-circuits/

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Bachelor of Science
B.Sc. Physics Practical Semester II

Course Code	US02IDPHY02	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. Flywheel 2. M.I. of Irregular Body using Torsional pendulum 3. Melde's experiment [T/L^2 = Constants] (A & B Position) 4. Measurement of self-inductance 5. Determination of 'k' using Bar pendulum 6. Study of probability distribution for two option system (coins) 7. Measurement of capacitance 8. Vibration magnetometer ((Determination of M_1 / M_2) 9. Half wave rectifier with filters (L & C) 10. Y by bending of beam 11. Full wave rectifier with filters (L & C) 12. Simulation of radioactive decay	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)
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 II

Course Code	**US02SEPHY01**	**Title of the Course**	**Electrical and Electronic components and measurement-II**
Total Credits of the Course	**02**	**Hours per Week**	**02**

Course Objectives:	1. To acquire basic understanding of electronic active 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.	**Active components:** **Diodes:** Semiconductors, The PN junction, The junction diode, Zener diodes, Varactor diode, PIN diode, Shokley diode, LEDs, Laser diodes. [Delton T. Horn: Ch. 5]	**50%**
2.	**Active components:** **Transistors:** Bipolar transistors, how a bipolar transistor works, alpha and beta, transistor amplifier configurations, Unijunction transistor, FETs. **Linear ICs:** Levels of integration, IC packaging, Representing ICs in schematics, IC sockets, linear versus digital. [Delton T. Horn: Ch. 6 and 7]	**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	
	construction and working of electronic components like various types diodes, BJT, FET, UJT and integrated circuits.
	principles, properties and uses of various diodes, transistors and integrated circuits.
	measurement of various active components used in advanced electronic circuits.

Suggested References:	
Sr. No.	**References**
1.	Basic electronic components by Vishwajit K. Barbudhe, Shraddha Zanjat and Bhavana S. Karmore, Notion Press, 2020
2.	Electronic components A complete reference for project builders by Delton T. Horn, TAB books, Division of McGraw-Hill Inc.
3.	Basic Electronics & Linear Circuits by Bhargava & Gupta, McGraw Hill Education, New Delhi.

4.	A text book of Electrical Technology by B. L. Theraja, S.Chand Publication.
5.	Basic electronics by 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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SARDAR PATEL UNIVERSITY

Vallabh Vidyanagar, Gujarat

(Reaccredited with 'A' Grade by NAAC (CGPA-3.11)

Syllabus with effect from the Academic Year 2024-2025

Bachelor of Science B.Sc.
Physics Semester II

Course Code	**US02SEPHY02**	**Title of the Course**	**Practical 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 familiar and experience with various electrical, electronic and optical tools. 2. To understand the basic concept of physics involving critical thinking. 3. To design experiments and to learn to extract meaningful physics principles from the experimental observation. 4. Gain the knowledge of various phenomena using hands on experiments.

Description	**Weightage (%)**
1. Study of spectrometer (Measurement of prism angle) 2. Bending of beam (elevation) 3. Construction of regulated power supply using IC 7805 4. Conversion of galvanometer to voltmeter 5. Bridge rectifier 6. Verification of Thevenin's theorem 7. Fourier series transformation 8. Conversion of data among different number systems and binary arithmetic 9. Growth and decay of current in LR circuit 10. Verification of Boolean laws with truth table	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 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.	Internal Practical Examination (As per CBCS R.6.8.3)	50%
2.	University Examination	50%

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)
5.	Basic Electronics; J.B. Gupta, S.K. Kataria & Sons 3rd Edition (2015)
6.	Practical Physics with Viva Voce; Dr. S. L. Gupta, Dr. V. Kumar, Pragati Prakashan, 3rd Edition

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