

BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI -24

(For B.Sc. Information Technology, Computer Science, Chemistry, Artificial Intelligence and Machine Learning, Cyber Security, Mathematics, Forensic Science & Geology, - Allied Courses)

(For the candidates admitted from the academic year 2026 – 2027 onwards)

ALLIED COURSE I

PHYSICS I

Code:

(Theory)

Credit: 4

COURSE OBJECTIVES:

- To know the elastic nature of materials, analyze the expression for Young's modulus and comprehend about viscosity and surface tension of fluids.
- To acquire knowledge of the centre of gravity, states of equilibrium of rigid bodies and stability of floating bodies.
- To understand the laws of thermodynamics, thermal conductivity and blackbody radiation.
- To familiarize the concepts of interference and diffraction.
- To know the formation, characteristics and applications of diodes and transistors.

UNIT-I PROPERTIES OF MATTER:

Elasticity: Stress – Strain– Hooke's law – Young's modulus- Behaviour of wire under progressive tension – Bending of beams – Expression for the bending moment – Measurement of Young's modulus by bending of beams – Non-uniform bending and Uniform bending.

Viscosity: Streamline flow and Turbulent flow – critical velocity - Poiseuille's formula – Determination of coefficient of viscosity of a liquid (Variable pressure head).

Surface Tension: Drop weight method of determining the surface tension of a Liquid–Experiment to determine the interfacial tension.

UNIT-II MECHANICS:

Centre of Gravity – Centre of Gravity of a solid hemisphere – Hollow hemisphere – Solid cone.

States of Equilibrium: Equilibrium of a rigid body – Stable, unstable and neutral equilibrium – Example.

Stability of Floating bodies – Metacentre – Determination of Metacentric height of a ship.

UNIT-III THERMAL PHYSICS:

Thermodynamics: Laws of thermodynamics – Reversible and irreversible process – Heat engine – Carnot's theorem.

Radiation: Blackbody – Stefan’s law–Newton’s law of cooling – Newton’s law of cooling from Stefan’s law – Experimental determination of Stefan’s constant – Wien’s displacement law – Rayleigh -Jean’s law – Planck’s law.

Heat Conduction: Coefficient of Thermal Conductivity –Determination of Thermal Conductivity of a bad Conductor by Lee’s disc method.

UNIT-IV OPTICS:

Interference: Superposition of waves –Principle of interference – Air wedge – Newton’s rings.

Diffraction: Introduction –Plane diffraction Grating – Theory of plane transmission Grating.

Fiber Optic communication: Introduction – Optic Fiber – Numerical Aperture – Coherent bundle – Fiber optic communication System and its advantages.

UNIT–V ELECTRONICS:

Intrinsic and extrinsic semiconductor – PN Junction diode – Biasing of PN junction – V - I characteristics of junction diode–Rectifiers– Half wave – Full wave and Bridge rectifiers – Zener diode –Characteristics of Zener diode – Voltage regulator – Transistor – Characteristics of transistor – CB and CE mode –Transistor as an amplifier.

UNIT–VI CURRENT CONTOURS (For internal continuous assessment only):

Rein forced concrete – Advanced Nano photonics – Surface tension of thermal fluids– Nano fluids – Low Viscous silicon liquid immersed transformers – Biodiesel – fuelled diesel engines – Electronic transformers.

REFERENCES:

1. R.Murugesan, *Properties of matter*, S.Chand& Co. Pvt. Ltd., Revised Edition, 2017.
2. Narayanamoorthy and N.Nagarathinam, *Mechanics Part II*, The NationalPublishingCompany,Chennai,2005.
3. Dr.N.Subramaniam, Brijlal and Dr.M.N.Avathanulu, *Optics*, S.Chand& Co. Pvt. Ltd. - 5 Edition, New Delhi, 2015.
4. BrijLal,N.Subrahmanyam,P.S.Hemne,*HeatandThermodynamics and Statistical Physics*, S.Chand& Co. Pvt. Ltd., Revised edition, 2021.
5. V.Vijayendran, S.Viswanathan, *Digital Fundamentals*, Printers & Publishers Private Ltd, Chennai, 2004.
6. Brijlal and Subramaniam, *Properties of Matter*, S.Chand& Co. Pvt. Ltd, 2005.
7. DSMathur,*Mechanics*,S.Chand&Co.ReprintEdition,2006
8. Brijlal and Subramaniam, *Thermal Physics*, S.Chand& Co., 2001.
9. R.Murugesan and KiruthigaSivaprasath, *A Text Book of Optics*, S.Chand& Co. Pvt. Ltd.- 9 th revised edition Ramnagar, New Delhi,

2014.

10. V.K.Mehta and RohitMehta, *PrinciplesofElectronics*, S.Chandand company Ltd., 2015.
11. <https://byjus.com>
12. <https://digitalcommons.unl.edu/cgi/viewcontent>.
13. <https://sciencing.com>

COURSEOUT COME:

Upon completion of this course, the students would be able to

- Apply the concepts of elasticity, viscosity and surface tension to solve problems encountered in everyday life.
- Understand the centre of gravity, states of equilibrium of rigid bodies and also stability of floating bodies.
- Understand the laws of thermo dynamics, thermal conductivity and black body radiation.
- Understand the theories and experiments on interference and diffraction using air wedge, Newton's ring and grating.
- Know the formation, characteristics and applications of diodes and transistor.

MAPPING WITH PROGRAM OUTCOMES: Map Course Outcomes (CO) for each course with Program Outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
C01	S	S	M	S	M	S	M	M	M	L
C02	S	S	S	S	M	M	M	M	M	M
C03	S	M	M	S	S	M	M	M	M	M
C04	S	S	S	S	S	M	M	M	M	S
C05	S	S	M	S	S	M	M	M	M	S

**ALLIED PRACTICAL
PHYSICS PRACTICAL I
(Practical)**

Code:

Credit:2

COURSE OBJECTIVES:

- To educate and motivate the students in the field of Physics.
- To acquire the skill of handling instrument.
- To develop the observation and circuit drawings skills.
- To enhance the process-oriented performances skills.
- To inculcate the skill of experimental verification of laws in Physics.

(ANY 12 EXPERIMENTS)

EXPERIMENTS:

1. Determination of Young's modulus by Non-Uniform bending using Pin and Microscope.
2. Determination of Young's modulus by Uniform bending using Scale and Telescope.
3. Surface tension and Interfacial Surface tension by Drop weight Method.
4. Coefficient of viscosity of a liquid – Variable Pressure head Method.
5. Specific heat capacity of a liquid by Newton's law of cooling Method.
6. Thermal conductivity of a bad conductor by Lee's disc Method.
7. Spectrometer – Refractive index of a solid prism.
8. Spectrometer – Finding the wavelength of spectral lines using Grating – Normal incidence method.
9. Newton's Rings – Determination of radius of curvature of a convex lens.
10. Air wedge – Thickness of the given thin wire.
11. Meter bridge – Determination of specific resistance of a coil.
12. Carey Foster's Bridge – Determination of specific resistance of a coil.
13. Potentiometer – Calibration of a Low range voltmeter.
14. Characteristics of a Junction diode – Forward resistance and knee voltage.
15. Characteristics of a Zener diode – Break down voltage.
16. Basic logic gates – AND, OR and NOT gates using discrete components.
17. Basic logic gates – AND, OR and NOT gates using ICs.
18. Realizing NAND as a Universal gate.
19. Realizing NOR as a Universal gate.
20. Verification of De-Morgan's theorem.

REFERENCES:

1. Department of Physics, *Practical Physics*, (B.Sc. Physics Main), St. Joseph's College, Tiruchirapalli-2009.
2. Dr. S. Somasundaram, *Practical Physics*, Apsara publications, Tiruchirapalli, 2012.
3. M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, *A text Book of Practical Physics*, S. Sultanch and publications, New Delhi, 2013.
4. Dr. R.K. Shukla, Dr. Anchal Srinivastava, *Practical Physics*, New Age International (P) Ltd, India, 2022.

5. P.R.Sasikumar, *Practical Physics*, PHI Learning Pvt.Ltd, New Delhi, 2011.
6. C.L. Arora, *A Text Book of Practical Physics*, S.Sultan chand publications, New Delhi, 2019.
7. Indu Prakash, Ram Krishna, A.K.Jha, *A text book of Practical Physics*, Kitab Mahal Publications, Delhi, 2011.
8. N.N. Ghosh, *B.Sc Practical Physics*, Bharath Bhawan Publications, India, 2nd Edition 2017.
9. <https://www.kanchiuni.ac.in/math>
10. <https://nptel.ac.in/courses>

Course Outcome:

Upon completion of this course, the student would be able to:

- Understand the Laboratory techniques.
- Evaluate a process based on the results obtained from the experiments quantitatively and qualitatively.
- Extend the scope of investigation as expected.
- Communicate a process with help of the outcomes of an experiment.
- Develop the skill of conducting an experiment collaboratively and ethically.

**ALLIED COURSE II
PHYSICS II**

Code:

(Theory)

Credit:4

COURSE OBJECTIVES:

- To understand the Coulomb's law and Gauss theorem and to gain a brief knowledge of capacitors.
- To acquire the knowledge on properties, types of magnetic materials and hysteresis of ferromagnetic material.
- To know atom models and understand the properties, types of x-rays and Crystal structure.
- To study the basics of nucleus and their properties, nuclear reaction, nuclear models and elementary particles.
- To learn the binary number system, binary arithmetic operations, logic gates and De-Morgan's theorem.

UNIT-I ELECTROSTATICS:

Coulomb's inverse square law – Gauss theorem and its applications- Intensity at a point due to a charged sphere and cylinder – Principle of a capacitor–Capacity of a spherical and cylindrical capacitors–Energy stored in a capacitor–Loss of energy due to sharing of charges – Capacitors in series and parallel–Types of capacitors.

UNIT –II MAGNETISM:

Intensity of magnetization – Susceptibility – Types of magnetic materials – Properties of para, dia and ferromagnetic materials–Cycle of magnetization – Hysteresis – B-H curve –Applications of B-H curve–Magnetic energy per unit volume–Ferro magnets and their applications.

UNIT-III ATOMIC PHYSICS:

Atom Models: Sommerfeld's and Vector atom Models – Pauli's exclusion principle –Various quantum number and quantization of orbits.

X-rays: Continuous and Characteristic X-rays–Mosley's Law and its importance–Bragg's law–Miller indices–Determination of Crystal Structure by Laue's Powder photograph method.

UNIT-IV NUCLEAR PHYSICS:

Introduction – Nucleus – Classification of Nuclei – Nuclear Size – Charge – Mass and Spin – Liquid drop model – Nuclear Radiations and their properties-Particle accelerators – Betatron – Proton Synchrotron – Four types of reactions – Elementary particles and their classifications.

UNIT-V DIGITAL ELECTRONICS:

Decimal–Binary Octal and Hexa Decimal number systems and their Mutual Conversions – 1's and 2's complement of a Binary number and Binary arithmetic (Addition, Subtraction, Multiplication and Division) – Binary Subtraction by 1's and 2's complement method – Basic logic gates –AND, OR, NOT – NAND, NOR and EX - OR gates –NAND and NOR as universal gates – De-Morgan's Theorems.

UNIT – VI CURRENT CONTOURS (For internal continuous assessment only):

Magnetic and electromagnetic components- Atom interferometer- Nuclear reactor simulations – Cold fusion – Artificial intelligence – Electronic Schoolbooks.

REFERENCES:

1. R.Murugesan, Er.Kiruthiga Sivaprasath, *Modern Physics*, S.Chand &Co, New Delhi, First edition, 2004
2. R.Murugesan, *Electricity and Magnetism*, S.Chand & Co, New Delhi, Third Revised Edition, 2008.
3. Brijlal & Subramanian, *Electricity and Magnetism*, RatanPrakashanMandir, 1995.
4. R.S.Sedha, *A text book of Digital Electronics*, S.Chand & Co, New Delhi, First Edition, 2008.
5. R.Murugesan, *Allied Physics Paper I and II*, S. Chand & Co, New Delhi, Revised Edition, 2010.
6. Arthur Beiser, Mahajan, Choudhury, *Concepts of Modern Physics*, Pustakkosh Publications, India, 2015
7. Gurbinder Kaur, Gary R Pickrell, *Modern Physics*, Tata Mcgraw Hill Educational (P) Ltd, India, 2014.
8. Narayanamurthi, *Electricity and Magnetism*, The National Publishing Co, First Edition, 1988.
9. J.B. Rajam, *Atomic Physics*, S.Chand & Company Limited, New Delhi, First Edition, 1990.
10. B.N. Srivastava, *Basic Nuclear Physic*, Pragati Prakashan, Meerut, 005.
11. Donald P. Leach, Albert Paul Malvino, Goutam Saha, *Digital principle and Applications*, McGraw-Hill Publishing Company, 6th Editions, New York, 2008.
12. <https://wepdf.com/al/allied-physics>
13. <https://archive.nptel.ac.in/courses>
14. <https://nptel.ac.in/courses>

COURSEOUTCOME:

Upon completion of this course, the student would be able to

- Understand Coulomb's law, Gauss the orem and gain a brief knowledge of capacitors.
- Understand the properties, types of magnetic materials and hysteresis of ferromagnetic material.
- Acquire the knowledge of atom models and X rays.
- Know the basics of nucleus and their properties, nuclear reaction, nuclear models and elementary particles.
- Learn the binary number system, binary arithmetic operations, logic gates and De-Morgan's Theorem.

MAPPING WITH PROGRAM OUTCOMES: Map Course Outcomes (CO) for each course with Program Outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
C01	S	S	M	S	M	S	M	M	M	M
C02	S	S	S	S	S	M	L	M	M	M
C03	S	M	M	S	S	M	M	M	M	M
C04	S	S	S	S	M	M	M	M	M	S
C05	S	S	M	S	S	S	M	M	M	S

**ALLIED COURSE I
APPLIED PHYSICS I
(Theory)**

Code:

Credit:4

COURSE OBJECTIVES:

- To bring out the subjects related with the computer field which help students to keep pace with these topics.
- To make the students understand the basic concepts of current electricity alternating current and the related laws.
- To enable the learner to acquire knowledge about four different number systems, conversion, Boolean algebra, Logic gates and semiconductor memories.

UNIT-I CURRENT ELECTRICITY:

Ohm's Law - Verification of Ohm's Law - Kirchhoff's law - Applications of Kirchhoff's law Wheat stone's bridge - Metre bridge - Carey Foster's bridge - Potentiometer Measurement of Current and Resistance - Calibration of low range Voltmeter.

UNIT- II ALTERNATING CURRENT:

AC circuits with double components – measurement of current and voltage – power in an AC Circuit-Power Factor (derivation)- Watt less current – Choke - series and parallel resonant circuits - Impedance-Q factor- Sharpness of resonance.

UNIT - III NUMBER SYSTEMS CODES AND LOGIC GATES:

Number Systems - Conversions - Binary: Addition, Subtraction, Multiplication, Division - 8421 Code - BCD Code - Excess 3 code - Gray code - Binary to Gray and Gray to Binary Conversion - ASCII code – Basic and Derivative Gates: AND, OR, NOT, NAND, NOR, EX-OR - NAND & NOR as Universal Gates.

**UNIT – IV BOOLEAN ALGEBRA, ARITHMETIC AND
COMBINATIONAL LOGIC CIRCUITS:**

Basic laws of Boolean algebra - De Morgan's theorem - Verification of Boolean expression using Boolean laws - Half - adder - Full adder - Half - Subtractor - Full subtractor (using basic gates) – Encoder - Decimal to BCD encoder - Decoder-BCD to decimal decoder.

UNIT-V SEMICONDUCTOR MEMORIES:

Introduction – ROM using diodes and transistors – ROM Minterms of digital circuits – Building memory of larger capacity – PROM – EPROM – EEPROM – ROM as a unit in microcomputers – RAM – Static RAM – Dynamic RAM – Memory Parameters.

UNIT-VI CURRENT CONTOURS (For continuous internal assessment only):

Solar electricity-Hydroelectricity-Digital camera-Digital television-CRO-Digital computer

REFERENCES:

1. BrijLal and N. Subrahmanyam, *A Text Book of Electricity and Magnetism*, S. Chand & Company Pvt. Ltd, New Deihi-2020.
2. PuriV.K., *Digital Electronic scircuits and systems*, TATA Mcgrawhill publications, New Delhi, 2011.
3. Vijayendran.V&Subramanian.V,*IntroductiontoIntegratedElectronics*,S. Viswanath PVT Ltd., Chennai 2012.
4. Murugesan.R,*ElectricityandMagnetism*,S.Chand&CompanyLtd.,Tentheditio n, 2017.
5. Sundara velusamy, A, *Applied Physics Paper-I B.Sc. Computer Science*, Karur: Priya Publications, 2011.
6. Narayanamurthi and Nagarathinam, *Electricity and Magnetism*, The National Publishing Company, Madras, 1994.
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8. GothamW.H., *Digital Electronics*,PrenticeHallofIndiaPVT.,NewDelhi,1996.
9. Sanjay D Jain, *Applied Physics*, Universities Press, Hyderabad, Telengana. 2013
10. Tewari K K, *Electricity and Magnetism*, S. Chand & Company Ltd.,3rdedition,2007.
11. Sathya Prakash, *Electricity and Magnetism*,Pragatiprakashan, 2016.
12. Arthur Beiser, *Concepts of Modern Physics* 2009, Mc Graw-Hill
13. J.R.Taylor,C.D. Zafiratos, M.A.Dubson,*ModernPhysics*,2009,PHILearning.
14. AlbertPaul,Malvino,*DigitalPrinciplesandApplications*,Delhi:TataMcgrawhill Publishing, 2012.
15. TewariKK,*Electricity and Magnetism*, S.Chand&CompanyLtd.,3rdedition,2007.
16. 1.<https://archive.nptel.ac.in/courses/115/106/115106122/>
17. 2.<https://pages.uoregon.edu/rayfrey/DigitalNotes.pdf>
18. 3.<https://nptel.ac.in/courses/117106086>

COURSEOUTCOMES:

Upon completion of this course, the students would be able to

- Recall the basic concepts of current electricity and its various laws.
- Solve basic electronics problems with ac circuits that involve capacitance, inductance, impedance, reactance and power calculations.
- Differentiate all the four number systems studied.
- Review Booleanalgebra and draw arithmetic circuits.
- Analyse the calibration of electrical instruments.

MAPPING WITH PROGRAM OUTCOMES: Map Course Outcomes (CO) for each course with Program Outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	S	M	M	M	L
CO2	S	S	S	S	M	M	L	M	M	M
CO3	S	M	M	S	S	M	M	M	M	M
CO4	S	S	S	S	S	M	M	M	M	S
CO5	S	S	M	S	S	S	M	M	M	S

**ALLIED PRACTICAL
APPLIED PHYSICS
(Practical)**

Code:

Credit:2

COURSE OBJECTIVES:

- To familiarize students with basic laboratory equipment to study the physics concepts encountered in the lecture course.
- To give knowledge of some basic electronic components and circuits.
- To promote the exhaustive requirements and expectations of the students to acquire practical knowledge for the theory given in their syllabus.

ANY 12 EXPERIMENTS:

1. Semi-Conduct ordiode- Characteristics.
2. Zener diode–Characteristics.
3. FET-Characteristics.
4. Transistor Characteristics-C Econfiguration.
5. Transistor Characteristics-CB Configuration.
6. Field along the axis of a coil–Determination of M and H
7. Metre Bridge-Determination of Specific Resistance.
8. Potentiometer-Measurement of Current.
9. Potentiometer-Calibration of low range volt meter.
10. Carey Foster’s Bridge-Determination of Specific Resistance.
11. LCR-Series resonance circuit
12. LCR-Parallel resonance circuit
13. Mathematical Operator-Addition, Subtraction using OP-Amp.
14. Logic Gates (AND,OR,NOT,NAND,NOR) Using IC’s.-Verification of truth tables.
15. NAND and NOR as Universal Gates.
16. Verification of De-Morgan’s Theorems.
17. Half Adder and Half Subtractor using logic gates.
18. Full Adder and Full Subtractor using logic gates.
19. Single Stage Amplifier.
20. LogicGates(AND,OR,NOT)UsingDiscrete’s.Components–Verificationoftruth tables.

REFERENCES:

1. Srinivasan M.N.BalasubramanianS.& RenganathanR.,A Text book of Practical Physics, Sulthan Chand & Sons, New Delhi, 2000.
2. SomasundramS.,Practical Physics, Apsara Publications, Tiruchirappalli. 2012.
3. AroraCL.,B.Sc.Practical physics,Chand and company, 2010.
4. Department of Physics, Practical Physics, (B.Sc.PhysicsMain), St.Joseph’s College, Tiruchirapalli 2009. .
5. Kushwaha P S., Applied physics practical & viva-voce, Bharat Bharati Prakashan & Co, 2015.
6. John Henderson, Practical Electricity and Magnetism, Forgotten books publisher, 2018.
7. TooleyM.,PracticalDigitalElectronicsHandbookBpbPublications,2008
8. <https://nptel.ac.in/courses/122106025>
9. https://onlinecourses.nptel.ac.in/noc20_ph16/preview

COURSEOUTCOMES:

Upon completion of this course, the students would be able to

- Gain the practical knowledge about electricity, magnetism and measurements such as resistance, voltage, current.
- Distinguish electronic components
- Construct the learnt electronic circuits on their own
- Analyze the logic gates and their usage in digital circuits.
- Develop the skill of conducting an experiment collaboratively.

**ALLIED COURSE II
APPLIED PHYSICS II
(Theory)**

Code:

Credit:4

COURSE OBJECTIVES:

- To impart knowledge of certain important fields of physics by simplifying the learning process to a greater extent
- To make the students understand how Laser and Maser is powerful than normal light, their types and its advantages.
- To inculcate the knowledge of transistor and different configurations, H parameters and applications of FET amplifier.

UNIT-I SEMICONDUCTOR PHYSICS

Theory of energy band in crystals-Distinction between conductors, Insulators and Semiconductors – Intrinsic and Extrinsic semiconductors – Hall effect in semiconductor– Zener diode – Tunnel diode - Backward diode - Breakdown voltage avalanche Breakdown.

UNIT-II TRANSISTORS:

Transistors - PNP and NPN transistors - DC Characteristics of CE and CB configuration-Hybrid parameters-Functions of Transistor as an amplifier and oscillator – FET-N-channel FET - performance Characteristics - FET amplifier.

UNIT- III LASERS:

Laser and Maser - Basic concepts of stimulated emission –Population inversion and Meta stable state-He-Ne laser-Ruby laser - Ammonia Maser - production – Advantages.

UNIT- IV OPTO-ELECTRONIC DEVICES:

LED Radiation transition - Emission spectra –Luminescent efficiency-Method of Excitation-Visible LED-Materials for LED - LED configuration -Photo conduction – Photodiode-Phototransistor-electronic watches-seven segment display-LCD.

UNIT-V OPERATIONAL AMPLIFIER:

The basic operational amplifier–Inverting and Non inverting operational Amplifier – Differential operational amplifier- CMRR-Basic uses of operational amplifier as sign and scale changer and phase shifter - Adder – Subtractor – comparator - Differentiator - ADC Successive approximation.

UNIT-VI CURRENT CONTOURS (For continuous internal assessment only):

Electric car technology-IOT sensors and devices-Robot control-Laser cladding-Barcode reader-Laser surgery-Laser pointer-ADC-DAC.

REFERENCES:

1. Jacob Millman, Microelectronics, Mc Graw Hill publications, New Delhi, 1985.
2. Mithal G.K. and Vanvasi, Pulse and Digital electronics, Khanna publication, New Delhi, 2006.
3. Sundara velusamy, A, Applied Physics Paper-II B.Sc Computer Science, Karur: Priya

- Publications, 2011.
4. Theraja, BL, Electronics Devices & Circuits, Delhi:S. Chand & Co, 2011
 5. Mehta V.K. & Mehta Rohit, Principles of Electronics (Multicolour Edition), 10th Rev.edition, 2006
 6. Ramanan, Function Electronics,TMH,NewDelhi,1994.
 7. Millman & Halkias, Electronics devices and Circuits, Mc Graw-Hill,1967.
 8. J.R. Taylor, C.D. Zafiratos, M.A. Dubson, Modern Physics,2009,PHI.
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 10. Ali, SN, Basic Electronics,Delhi:Vayu Education of India,2011
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 13. William T. Silfvast, Laser fundamentals Second edition ,University of Central Florid, Cambridge University Press, June 2012.
 14. K. Thyagarajan Ajoy Ghatak, Lasers- Fundamentals And Applications ,Edition:2, Laxmi Publications Pvt Ltd,2019
 15. Thomas F. Schubert, Jr. And Ernest M. Kim. Fundamentals Of electronics. Book 1, Electronic devices and circuit applications, San Rafael, California(1537FourthStreet, San Rafael, CA 94901 USA): Morgan & Claypool, 2014.
 16. <https://nptel.ac.in/courses/115102025>
 17. <https://www.classcentral.com/course/swayam-laser-fundamentals-and-applications-12914>.
 18. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_op_amp_applications.htm

COURSE OUTCOME:

Upon completion of this course, the students would be able to

- Understand the rapid growth of electronic technology.
- Know the semi conductors classification and their applications invarious domains.
- Analyse the characteristics of transistor, transistor biasing circuits and oscillator circuits.
- Evaluate the advantages of Opto-Electronic Devices.
- Demonstrate analog electrical devices, particularly operational amplifiers and their applications applying the learnt concepts.

MAPPING WITH PROGRAM OUTCOMES: Map Course Outcomes (CO) for each course with Program Outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	S	M	M	M	L
CO2	S	S	S	S	M	M	L	M	M	M
CO3	S	M	S	S	S	M	M	M	M	M
CO4	S	S	S	S	S	M	M	M	M	S
CO5	S	S	S	S	S	S	M	M	M	M