GOVERNMENT ARTS COLLEGE (AUTONOMOUS)

KUMBAKONAM

DEPARTMENT OF PHYSICS

B.Sc.

Curriculam and Syllabus

Scheme for the B.Sc., Students

Choice Based Credit System

From 2023 – 2024 onwards

GOVERNMENT ARTS COLLEGE (AUTO), KUMBAKONAM
DEPARTMENT OF PHYSICS

Scheme for the *B.Sc., Students*

Course structure under CBCS

From *2023 – 2024* Onwards

SEM	Part	Course title	Credits	Instruction hrs/week	Marks		Total marks
					Internal	External	
I	I	Language - Tamil Paper – I	3	6	25	75	100
	II	English Paper – I	3	6	25	75	100
	III	**CC I – Properties of Matter and Acoustics**	5	5	25	75	100
	III	Core Practical I **- Properties of matter**	3	3	40	60	100
	III	Allied course I – Allied Mathematics–I	4	4	25	75	100
	III	Allied course II – Allied Mathematics–II	-	2	-	-	-
	IV	Value Education	2	2	25	75	100
	IV	Foundation course – Introductory Physics	2	2	25	75	100
		TOTAL	**22**	**30**	**Total marks**		**700**
II	I	Language - Tamil Paper – II	3	6	25	75	100
	II	English Paper – II	3	6	25	75	100
	III	**CC II – Heat, Thermodynamics and Statistical Physics**	5	5	25	75	100
	III	Core Practical II – **Heat, Oscillations, Waves and Sound**	3	3	40	60	100
	III	Allied course – II – Allied Mathematics –II	2	2	25	75	100
	III	Allied course – II – Allied Mathematics –III	4	4	25	75	100
	IV	Environmental studies	2	2	25	75	100
	IV	Skill Enhancement course/Naan mudhalvan	2	2	25	75	100
		TOTAL	**24**	**30**	**Total marks**		**800**
	I	Language Tamil Paper – III	3	6	25	75	100
	II	English Paper –III	3	6	25	75	100

III	III	**CC III – Mechanics**	5	5	25	75	100
	III	Core Practical III – **Electricity**	3	3	40	60	100
	III	Allied course III Allied Chemistry – I	4	4	25	75	100
	III	Allied Practical-I – Allied Chemistry Practical –I	-	2	-	-	-
	IV	Skill Enhancement course SEC-II – Domestic Electrical Appliances	2	2	25	75	100
	IV	Skill Enhancement course SEC- III/Naan mudhalvan	2	2	25	75	100
		TOTAL	**22**	**30**			**700**
IV	I	Language Tamil Paper – IV	3	6	25	75	100
	II	English Paper –IV	3	6	25	75	100
	III	**CC IV – Optics and Laser Physics**	5	5	25	75	100
	III	Core Practical IV – **Light**	3	3	40	60	100
	III	Allied course IV Allied Chemistry – II	4	4	25	75	100
	III	Allied Practical-I – Allied Chemistry Practical –I	2	2	40	60	100
	IV	Skill Enhancement course SEC-IV Soft skill	2	2	25	75	100
	IV	Skill Enhancement course SEC- V/Naan mudhalvan	2	2	25	75	100
		TOTAL	**24**	**30**			**700**

SEM	Part	Course title	Credits	Instruction hrs/week	Marks		Total marks
					Internal	External	
V	III	Core course V- **Electricity, Magnetism and Electromagnetism**	5	5	25	75	100
	III	Core course VI - **Atomic And Nuclear Physics**	4	5	25	75	100
	III	Core course VII – **Analog and Communication Electronics**	4	4	25	75	100
	III	Core Practical V **- General**	3	6	40	60	100
	III	Major based Elective course – I **Numerical methods and C programming**	3	4	25	75	100
	III	Major based Elective couse – II **Lasers and Fiber optics**	3	4	25	75	100
	IV	Skill Enhancement course SEC- VI/Naan mudhalvan	2	2	25	75	100
	IV	Intenship/Industrial visit/Field visit	2	-	-	-	-
		TOTAL	**26**	**30**	**Total marks**		**700**
VI	III	Core course –VIII **Quantum mechanics and Relativity**	5	6	25	75	100
	III	Core course –IX **Solid State Physics**	5	6	25	75	100
	III	Core Practical VI –**Electronics**	3	6	40	60	100
	III	Major based Elective course III – **Digital Electronics and Microprocessor 8085**	3	5	25	75	100
	III	Major based Elective course – IV **Nano science and nano technology**	3	5	25	75	100
	IV	Skill Enhancement course/Naan mudhalvan	2	2	25	75	100
	IV	Extension activity	1	-	-	-	-
	V	Gender Studies	1	2	25	75	100
		TOTAL	**23**	**31**	**Total marks**		**700**

COURSE PATTERN - SUMMARY			
PART	**Subject**	**TOTAL PAPERS**	**CREDITS**
Part I	Tamil	4	12
Part II	English	4	12
Part III	Core Course	9	43
	Core Practical	6	18
	Allied Course	5	18
	Allied Course - Practical	1	2
	Major Based Elective Course	4	12
Part IV	Foundation Course - I	1	2
	Value Education	1	2
	Environmental Studies	1	2
	Skill Enhancement Course SEC / Naan Mudhalvan	7	14
	Internship/ Industrial Visit/ Field Visit		2
	Extension Activity		1
	Gender studies	1	1
NET TOTAL		**44**	**141**

COMMON SCHEME

Part – A [10 × 2 = 20]

Two short answer questions from each unit (5 units) 10 questions:

(1) & (2) – Unit I

(3) & (4) – Unit II

(5) & (6) – Unit III

(7) & (8) – Unit IV

(9) & (10) – Unit V

Part – B [5 × 5 = 25]

Two questions from each unit (5 units) either or type:

(11) a (or) b – Unit I

(12) a (or) b – Unit II

(13) a (or) b – Unit III

(14) a (or) b – Unit IV

(15) a (or) b – Unit V

Part – C [3 × 10 = 30]

(Answer any three)

Five long answer questions one from each unit (5 units):

(16) Unit I

(17) Unit II

(18) Unit III

(19) Unit IV

(20) Unit V

Question pattern for foundation course:

Part – A [10 × 2 = 20Marks]
(10 out of 15 Qns)

Part – B [11 × 5 = 55 Marks]
(11 out of 15 Qns)

COURSE	FIRST SEMESTER – CC I
COURSE TITLE	PROPERTIES OF MATTER AND ACOUSTICS
CREDITS	5
COURSE OBJECTIVES	Study of the properties of matter leads to information which is of practical value to both the physicist and the engineers. It gives us information about the internal forces which act between the constituent parts of the substance. Students who undergo this course are successfully bound to get a better insight and understanding of the subject.
UNITS	COURSE DETAILS
UNIT-I	**ELASTICITY:** Introduction – stress-strain –Hooke's law – elastic constants – Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in stretching and twisting a wire – twisting couple on a cylinder – rigidity modulus by static torsion– torsional pendulum (with and without masses)
UNIT-II	**BENDING OF BEAMS:** expression for Bending moment - cantilever– expression for depression at the loaded end of the cantilever– oscillations of a cantilever – expression for time period – experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope
UNIT-III	**FLUID DYNAMICS:** Surface tension: definition – molecular forces– excess pressure over curved surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaegar's method–variation of surface tension with temperature Viscosity:definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –corrections – terminal velocity and Stoke's formula– variation of viscosity with temperature
UNIT-IV	**WAVES AND OSCILLATIONS:** Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures- Laws of transverse vibration in strings –sonometer – determination of AC frequency using sonometer–determination of frequency using Melde'sstring apparatus
UNIT-V	**ACOUSTICS OF BUILDINGS AND ULTRASONICS**: Intensity of sound – decibel – loudness of sound –reverberation – Sabine's reverberation formula – acoustic intensity – factors affecting the acoustics of buildings. Ultrasonic waves: production of ultrasonic waves – Piezoelectric crystal method –magnetostriction effect – application of ultrasonic waves
UNIT-VI	PROFESSIONAL COMPONENTS: expert lectures –seminars — webinars – industry inputs – social accountability – patriotism

TEXT BOOKS	1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand and Co. 2. Brijlal and N. Subrahmanyam, 2003, Properties of Matter, S.Chand and Co 3. D.R.Khanna andR.S.Bedi, 1969, Textbook of Sound, AtmaRamand sons 4. Brijlal and N.Subrahmanyam, 1995, A Text Book of Sound, Second revised edition,Vikas Publishing House. 5. R.Murugesan,2012, Properties of Matter, S.Chandand Co.
REFERENCEBOOKS	1. C.J. Smith, 1960, General Properties of Matter, Orient Longman Publishers 2. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition,R. Chand and Co. 3. A.P French, 1973, Vibration and Waves, MIT Introductory Physics, Arnold-Heinmann India.
WEB RESOURCES	1. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work 2. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html 3. https://www.youtube.com/watch?v=gT8Nth9NWPM 4. https://www.youtube.com/watch?v=m4u-SuaSu1sandt=3s 5. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work 6. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/ 7. http://www.sound-physics.com/ 8. http://nptel.ac.in/courses/112104026/

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	To understand the nature of material in everyday life, when force is applied.
	CO2	Give us idea about how accurate value of forces we have to apply when we handle this material
	CO3	The topic gives essential knowledge about fluid dynamics for living things
	CO4	The unit explores sound energy propagation basis.
	CO5	Gives us importance of the maintaining reverberation in building to make it conducive.

MAPPING WITH PROGRAM OUTCOMES:

Map course outcomes **(CO)** for each course with program outcomes **(PO)** in the 3-point scale of STRONG (**3**), MEDIUM (**2**) and LOW (**1**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

COURSE	FIRST SEMESTER –CORE PRACTICAL 1
COURSETITLE	PRACTICAL 1
CREDITS	3
COURSE OBJECTIVES	Apply various physics concepts to understand Properties of Matter, set up experimentation to verify theories, quantify and analyze, able to do error analysis and correlate results

Properties of Matter

Minimum of Eight Experiments from the list:

1. Determination of rigidity modulus without mass using Torsional pendulum.
2. Determination of rigidity modulus with masses using Torsional pendulum.
3. Determination of Young's modulus by stretching of wire with known masses.
4. Determination of Young's modulus by uniform bending – pin and microscope.
5. Determination of Young's modulus by non-uniform bending – scale and telescope.
6. Determination of Young's modulus by cantilever – pin and microscope
7. Determination of Young's modulus by cantilever – oscillation method
8. Determination of Young's modulus by Koenig's method .
9. Determination of rigidity modulus by static torsion.
10. Determination of surface tension and interfacial surface tension by drop weight method.
11. Determination of co-efficient of viscosity by Stokes' method – terminal velocity.
12. Determination of g using compound pendulum.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE	FIRST SEMESTER – FOUNDATION COURSE
COURSE TITLE	INTRODUCTORY PHYSICS
CREDITS	2
COURSE OBJECTIVES	To help students get an overview of Physics before learning their core courses. To serve as a bridge between the school curriculum and the degree programme.

UNITS	COURSE DETAILS
UNIT-I	Vectors, scalars – examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions– standard physics constants.
UNIT-II	Different types of forces – gravitational, electrostatic, magnetic, electromagnetic, nuclear – mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces.
UNIT-III	Different forms of energy – conservation laws of momentum, energy – types of collisions – angular momentum – alternate energy sources – real life examples
UNIT-IV	Types of motion – linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads – stream line and turbulent motions – wave motion – comparison of light and sound waves – definition- free, forced, damped oscillations- Resonance-sharpness of resonance.
UNIT-V	Surface tension – shape of liquid drop – angle of contact – viscosity – lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use- conductors, insulators – thermal and electric
UNIT-VI	**PROFESSIONAL COMPONENTS:** Expert lectures – seminars — webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1. D.S. Mathur, 2010, Elements of Properties of Matter, S.Chand and Co 2. BrijLaland N. Subrahmanyam, 2003, Properties of Matter, S.Chand and Co.
REFERENCE BOOKS	1. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, S.Chand and Co.
WEB RESOURCES	1. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://science.nasa.gov/ems/ 2. https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

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

MAPPING WITH PROGRAM OUTCOMES:

Map course outcomes **(CO)** for each course with program outcomes **(PO)** in the 3-point scale of STRONG (**3**), MEDIUM (**2**) and LOW (**1**).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

COURSE	SECOND SEMESTER – CC II
COURSE TITLE	HEAT, THERMODYNAMICS AND STATISTICAL PHYSICS
CREDITS	5
COURSE OBJECTIVES	The course focuses to understand a basic in conversion of temperature in Celsius, Kelvin and Fahrenheit scales. Practical exhibition and explanation of transmission of heat in good and bad conductor. Relate the laws of thermodynamics, and explore the knowledge of statistical mechanics and its relation
UNITS	COURSE DETAILS
UNIT-I	**CALORIMETRY:** Specific heat capacity – specific heat capacity of gases C_P and C_V– Meyer's relation – Joly's method for determination of C_V – Regnault's method for determination of C_P **LOW TEMPERATURE PHYSICS**: Joule-Kelvin effect – porous plug experiment – Joule-Thomson effect –Boyle temperature – temperature of inversion – liquefaction of gas by Linde's Process – adiabatic demagnetisation.
UNIT-II	**THERMODYNAMICS-I**: Zeroth law and first law of thermodynamics – P-V diagram – heat engine – efficiency of heat engine- isothermal and adiabatic – Carnot's engine, construction, working and efficiency of diesel engines
UNIT-III	**THERMODYNAMICS-II:** Second law of thermodynamics –entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram –thermo dynamical scale of temperature – Maxwell's thermo dynamical relations –Clasius- Clapeyron's equation (first latent heat equation) – third law of thermodynamics – un attainability of absolute zero .
UNIT-IV	**HEAT TRANSFER:** Modes of heat transfer: conduction, convection and radiation. Conduction: thermal conductivity – determination of thermal conductivity of a good conductor by Forbe's method – determination of thermal conductivity of a bad conductor by Lee's disc method. Radiation: black body radiation (Ferry's method) – distribution of energy in black body radiation – Wien's law and Rayleigh Jean's law –Planck's law of radiation – Stefan's law – deduction of Newton's law of cooling from Stefan's law.
UNIT-V	**STATISTICAL MECHANICS:** definition of phase-space – micro and macro states – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function – Bose-Einstein statistics – expression for distribution function – Fermi-Dirac statistics –expression for distribution function – comparison of three statistics.
UNIT-VI	**PROFESSIONAL COMPONENTS**: Expert lectures –seminars — webinar– industry inputs – social accountability – patriotism

TEXT BOOKS	1. Brijlal andN. Subramaniam, 2000, Heat and Thermodynamics, S.Chand and Co. 2. Narayanamoorthy and KrishnaRao, 1969,Heat,Triveni Publishers, Chennai. 3. V.R.KhannaandR.S.Bedi, 1998 1st Edition, Text book of Sound, Kedharnaath Publish and Co, Meerut 4. Brijlal and N. Subramanyam, 2001, Waves and Oscillations,Vikas Publishing House, New Delhi. 5. Ghosh, 1996, Text Book of Sound, S.ChandandCo. 6. R.Murugeshan and Kiruthiga Sivaprasath, Thermal Physics, S.Chandand Co.
REFERENCE BOOKS	1. J.B.Rajam and C.L.Arora, 1976, Heat and Thermodynamics, 8th edition, S.Chandand Co. Ltd. 2. D.S.Mathur, Heat and Thermodynamics, Sultan Chand and Sons. 3. Gupta, Kumar, Sharma, 2013, Statistical Mechanics, 26th Edition, S. Chand and Co. 4. Resnick, HallidayandWalker,2010, Fundamentals of Physics, 6th Edition. 5. Sears, Zemansky, Hugh D. Young,Roger A. Freedman, 2021 University Physics with Modern Physics 15th Edition, Pearson.
WEB RESOURCES	1. https://youtu.be/M_5KYncYNyc 2. https://www.youtube.com/watch?v=4M72kQulGKkandvl=en 3. Lecture 1: Thermodynamics Part 1 | Video Lectures | Statistical Mechanics I: Statistical Mechanics of Particles | Physics | MIT OpenCourseWare 4. http://www.freebookcentre.net/Physics/Physics-Books-Online.html

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

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

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes **(CO)** for each course with program outcomes **(PO)** in the 3-point scale of STRONG (**S**), MEDIUM (**M**) and LOW (**L**).

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

COURSE	**SECOND SEMESTER – CORE PRACTICAL II**
COURSETITLE	**HEAT, OSCILLATIONS, WAVES and SOUND**
CREDITS	3
COURSE OBJECTIVES	Apply their knowledge gained about the concept of heat and sound waves, resonance, calculate frequency of ac mains set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

HEAT, OSCILLATIONS, WAVES AND SOUND

Minimum of Eight Experiments from the list:

1. Determination of specific heat by cooling – graphical method.
2. Determination of thermal conductivity of bad conductor by Lee's disc method. .
3. Determination of specific heat of liquid by Joule's calorimeter.
4. Determination of Latent heat of a vaporization of a liquid.
5. Determination of Stefan's constant for Black body radiation.
6. Verification of Stefan's-Boltzmans law.
7. Determination of thermal conductivity of rubber tube.
8. Velocity of sound through a wire using Sonometer.
9. Determination of velocity of sound using Kunds tube.
10. To verify the laws of transverse vibration using sonometer.
11. To verify the laws of transverse vibration using Melde's apparatus.
12. To compare the mass per unit length of two strings using Melde's apparatus.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
40	**60**	**100**	

COURSE	THIRD SEMESTER – CORE- CC III
COURSETITLE	MECHANICS
CREDITS	4
COURSE OBJECTIVES	This course allows the students: To have a basic understanding of the laws and principles of mechanics; To apply the concepts of forces existing in the system; To visualize conservation laws; To apply Lagrangian equation to solve complex problems.

UNITS	COURSEDETAILS
UNIT-I	**GRAVITATION:** Kepler's laws, Newton's law of gravitation – Determination of G by Boy's method – Earth-moon system – earth satellites – earth density – mass of the Sun – gravitational potential – velocity of escape –Einstein's theory of gravitation – introduction – principle of equivalence.
UNIT-II	**CONSERVATION LAWS OF LINEAR AND ANGULAR MOMENTUM: c**onservation of linear and angular momentum – Internal forces and momentum conservation – center of mass – examples – general elastic collision of particles of different masses – system with variable mass – examples – conservation of angular momentum – torque due to internal forces – torque due to gravity – angular momentum about center of mass.
UNIT-III	**CONSERVATION LAWS OF ENERGY:** Introduction – significance of conservation laws – law of conservation of energy concepts of work-power – energy – conservative forces – potential energy and conservation of energy in gravitational and electric field – examples –non-conservative forces – general law of conservation of energy.
UNIT-IV	**RIGID BODY DYNAMICS: T**ranslational and rotational motion – angular momentum – moment of inertia – general theorems of moment of inertia – examples – rotation about fixed axis – kinetic energy of rotation – examples – body rolling along a plane surface – body rolling down an inclined plane.
UNIT-V	**LAGRANGIAN MECHANICS:** generalized coordinates –degrees of freedom – constraints – types of constraints- principle of virtual work and D' Alembert's Principle – Lagrange's equation from D' Alembert's principle – application –simple pendulum – Atwood's machine.
UNIT-VI	**PROFESSIONAL COMPONENTS:**expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1. J.C.Upadhyaya, 2019, Classical Mechanics, Himalaya Publishing house, Mumbai. 2. P.Durai Pandian, Laxmi Durai Pandian, Muthamizh Jayapragasam,2005, Mechanics, 6threvised edition, S.Chandand Co. 3. D. S.Mathur and P. S.Hemne, 2000, Mechanics, Revised Edition, S.Chandand Co.

	4. Narayanamurthi, M.and Nagarathnam. N, 1998, Dynamics. The National Publishing,Chennai. 5. Narayanamurthi, M. and Nagarathnam, N, 1982, Statics, Hydrostatics and Hydrodynamics, The National Publishers, Chennai.
REFERENCEBOOKS	1. Goldstein Herbert, 1980, Classical Mechanics. U.S.A: Addison and Wesely. 2. Halliday, David and Robert, Resnick, 1995, Physics Vol.I. New Age, International, Chennai. 3. Halliday, David Robert Resnick and Walker Jearl, 2001, Fundamentals of Physics, John Wiley, New Delhi
WEB RESOURCES	1. https://youtu.be/X4_K-XLUIB4 2. https://nptel.ac.in/courses/115103115 3. https://www.youtube.com/watch?v=p075LPq3Eas 4. https://www.youtube.com/watch?v=mH_pS6fruyg 5. https://onlinecourses.nptel.ac.in/noc22_me96/preview 6. https://www.youtube.com/watch?v=tdkFc88Fw-M 7. https://onlinecourses.nptel.ac.in/noc21_me70/preview

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUT COMES	**CO1**	Understand the Newton's Law of motion, understand general theory of relativity, Kepler's laws and Realize the basic principles behind planetary motion
	CO2	Acquire the knowledge on the conservation laws
	CO3	Apply conservation law and calculate energy of various systems, understand and differentiate conservative and non-conservative forces
	CO4	Gain knowledge on rigid body dynamics and solve problems based on this concept
	CO5	Appreciate Lagrangian system of mechanics, apply D' Alemberts principle

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes **(CO)**for each course with program out comes **(PO)** in the 3-point scale of STRONG(**S**),MEDIUM(**M**) and LOW(**L**).

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

COURSE	**THIRD SEMESTER - COREPRACTICAL 3**
COURSETITLE	**PRACTICAL 3**
CREDITS	3
COURSE OBJECTIVES	Construct circuits to learn about the concept of electricity, current, resistance in the path of current, different parameters that affect a circuit. Set up experiments, observe, analyse and assimilate the concept

ELECTRICITY

Minimum of Eight Experiments from the list:

1. Calibration of low range voltmeter using potentiometer
2. Calibration of high range voltmeter using potentiometer
3. Calibration of ammeter using potentiometer.
4. Measurement of low resistances using potentiometer.
5. Determination of field along the axis of a current carrying circular coil.
6. Determination of earth's magnetic field using field along axis of current carrying coil.
7. Determination of specific resistance of the material of the wire usingPO box.
8. Determination of resistance and specific resistance using Carey Foster's bridge.
9. Determination of internal resistance of a cell using potentiometer.
10. Determination of specific conductance of an electrolyte - Kohlreusch bridge method.
11. Determination of e.m.f of thermo couple using potentiometer
12. Determination of figure of merit of BG or spot galvanometer.
13. Comparison of EMF of two cells using BG.
14. Comparison of capacitance using BG.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE	THIRD SEMESTER – SEC -II
COURSETITLE	DOMESTIC ELECTRICAL APPLIANCES
CREDITS	2
COURSE OBJECTIVES	To understand the basic concepts of Electricity and Electrical Components. To gain the knowledge in handling the electrical instruments. To Know the basic principles of Domestic electrical appliances
UNITS	COURSE DETAILS
UNIT-I	**FUNDAMENTALS OF ELECTRICITY**: What is electricity – Current – AC – DC – Advantages of AC over DC – Advantages of DC over AC – Phase – Single phase – Poly phase – Advantages of poly phase over single phase – Primary and Secondary cells – Difference between primary and secondary cells – Electrical Shocks and its effects.
UNIT-II	**ELECTRICAL COMPONENTS**: Conductor – Insulator – Resistor – Inductors- Capacitor – Transformer – step up and step down transformers – AC and DC generators.
UNIT-III	**MEASURING INSTRUMENTS**: Galvanometer – Ammeter – Voltmeter – Ohm meter – AVO meter (Multimeter) - CRO – Watt hour meter – Commercial electrical billing(Problem).
UNIT-IV	**LIGHTING AND HEATING APPLIANCES**: Design and working of – a) Incandescent lamp – b) Fluorescent lamp – c) LED – d) CFL – e) Electric iron – f) Immersion heater.
UNIT-V	**MODERN ELECTRICAL APPLIANCES:** Design and working of a) Water motors and its types b) Microwave oven c) Remote control d) UPS e) Inverter
UNIT-VI	**PROFESSIONAL COMPONENTS**: expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1) Basic electrical engineering by M.L.Anwani, Dhanpat Rai and Co. New Delhi – Reprint. 2) Domestic electrical appliances – General interest book from market shelf.
WEB RESOURCES	http:// www.answers.com http:// www.wikipedia.org

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Differentiate between AC and DC circuits and obtain the knowledge about primary and secondary cells
	CO2	Obtain the knowledge of the basic electrical components.
	CO3	Understand the concepts of basic measuring components.
	CO4	Acquire the knowledge of Design and working with basic lighting and heating appliances.
	CO5	Acquire the knowledge of modern electrical appliances.

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)**for each course with program out comes**(PO)**in the 3-pointscale of STRONG(**S**),MEDIUM(**M**)and LOW(**L**).

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

COURSE	FOURTH SEMESTER – CORE-CC 4
COURSETITLE	OPTICS AND LASER PHYSICS
CREDITS	4
COURSE OBJECTIVES	To provide an in-depth understanding of the basics of various phenomena in geometrical and wave optics; To explain the behavior of light in different mediums; To understand the differences in the important phenomena namely interference, diffraction and Polarization and apply the knowledge in day to day life; To understand the design of optical systems and methods to minims aberrations; To understand the working and applications of laser

UNITS	COURSE DETAILS
UNIT-I	**LENS AND PRISMS:** *Lens*: aberrations: spherical aberration- methods of elimination- coma , astigmatism– curvature of the field and distortion – chromatic aberrations – achromatism- lenses in contact-lenses in separation. *Prism*: dispersion, deviation, achromatism in prism- dispersion with out deviation and deviation with out dispersion – rainbows –primary and secondary. *Eyepieces*: Huygen's and Ramsden's eyepieces, construction and working –comparison of eyepieces.
UNIT-II	**INTERFERENCE:** Interference in thin films due to, (i) reflected light, (ii) transmitted light – colours of thin films – air wedge – thickness of wire- Newton's rings- refractive index of a liquid. *Interferometers* : Michelson's interferometer – applications, (i) determination of the wavelength of a monochromatic source of light.
UNIT-III	**DIFFRACTION:** Fresnel's rectilinear propagation of light – zone plate – action of zone plate for an incident spherical wave front – differences between a zone plate and a convex lens –diffraction pattern due to a straight edge – positions of maximum and minimum intensities – Fraunhofer diffraction at a single slit – plane diffraction grating– experiment to determine wavelengths – width of principal maxima. *Resolving power*: Rayleigh's criterion for resolution – resolving power of, (i) Prism (ii) grating.
UNIT-IV	**POLARISATION:** Double refraction-nickel prism as a polarizer and analyser– Huygens's explanation of double refraction in uniaxial crystals –polaroids and applications – circularly and elliptically polarized light- production and detection –quarter wave plate – half wave plate – optical activity- Fresnel's explanation of optical activity – Laurent's half shade polarimeter.
UNIT-V	**LASERS:** general principles of lasers – properties of lasers action – spontaneous and stimulated emission – population inversion – optical pumping – He-Ne laser (principle and working) – CO_2 laser (principle and working) semiconductor laser – laser applications – holography.

UNIT-VI	**PROFESSIONAL COMPONENTS:**expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1. Subramaniam. N andBrijlal, 2014, Optics, 25th Ed,S.Chandand Co. 2. P.R.Sasikumar, 2012, Photonics, PHIPvt Ltd, New Delhi. 3. V.Rajendran, 2012, Engineering Physics, Tata McGraw Hill.
REFERENCE BOOKS	1. Sathyaprakash, 1990,Optics,VII edition, RatanPrakashanMandhir, New Delhi. 2. AjoyGhatak, 2009,Optics, 4th edition, PHIPvt Ltd, New Delhi. 3. D.Halliday,R.Resnick and J. Walker, 2001, Fundamentals of Physics,6th edition, Willey, New York. 4. 7. JenkinsA.Francis and White, 2011, Fundamentals of Optics, 4th edition, McGraw Hill Inc., NewDelhi.
WEB RESOURCES	1. https://science.nasa.gov/ems/ 2. https://www.youtube.com/watch?v=tL3rNc1G0qQandlist=RDCMUCzwo7UlGkb-8Pr6svxWo-LAandstart_radio=1andt=2472 3. https://science.nasa.gov/ems/ 4. https://imagine.gsfc.nasa.gov/educators/gammarabursts/imagine/index.html 5. http://www.thephysicsmill.com/2014/03/23/sky-blue-lord-rayleigh-sir-raman-scattering/

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUT COMES	**CO1**	Outline basic knowledge of methods of rectifying different defects in lenses, articulate technological applications of eyepieces
	CO2	Discuss the principle of superposition of wave, use these ideas to understand the wave nature of light through working of interferometer
	CO3	Extend the knowledge about nature of light through diffraction techniques; apply mathematical principles to analyze the optical instruments
	CO4	Interpret basic formulation of polarization and gain knowledge about polarimeter, appraise its usage in industries
	CO5	Understand the principle of laser actions, gain the knowledge of different laser productions.

MAPPING WITH PROGRAM OUT COMES:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**),MEDIUM(**M**)andLOW(**L**).

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

COURSE	FOURTH SEMESTER - CORE PRACTICAL 4
COURSETITLE	PRACTICAL 4
CREDITS	3
COURSE OBJECTIVES	Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results.

LIGHT(any eight experiments)

Minimum of Eight Experiments from the list:

1. Determination of refractive index of prism using spectrometer.
2. Determination of refractive index of liquid using hollow prism and spectrometer
3. Determination of dispersive power of a prism.
4. Determination of radius of curvature of lens by forming Newton's rings.
5. Determination of thickness of a wire using air wedge.
6. Determination of Cauchy's Constants.
7. Determination of refractive index of a given liquid by forming liquid lens
8. Determination of refractive index using Laser.
9. Determination of wavelengths, particle size using Laser/Monochromatic source.
10. Determination of resolving power of Diffraction grating using Laser
11. Determination of thickness of a wire using Laser.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE	FIFTH SEMESTER – CORE - CC 5
COURSETITLE	ELECTRICITY, MAGNETISM ANDELECTROMAGNETISM
CREDITS	4
COURSE OBJECTIVES	To classify materials based on their electrical and magnetic properties. To analyze the working principles of electrical gadgets. To understand the behavior of dc, ac and transient currents. To know about the communication by electromagnetic waves.
UNITS	COURSE DETAILS
UNIT-I	**CAPACITORS AND THERMO ELECTRICITY**: capacitor – principle – capacitance of spherical and cylindrical capacitors – capacitance of a parallel plate capacitor (with and without dielectric slab) – effect of dielectric –Carey Foster bridge – temperature coefficient of resistance – Seebeck effect – laws of thermo emf – Peltier effect – Thomson effect – thermoelectric diagrams –uses of thermoelectric diagrams – thermodynamics of thermo couple - determination of Peltier and Thomson coefficients.
UNIT-II	**MAGNETIC EFFECTS OF CURRENT**: Biot and Savart's law – magnetic induction due to circular coil – magnetic induction due to solenoid – force on a current element by magnetic field – force between two infinitely long conductors – torque on a current loop in a field - moving coil galvanometer – damping correction – Ampere's circuital law – differential form – divergence of magnetic field – magnetic induction due to toroid.
UNIT-III	**MAGNETISM** : Magnetizing field- magnetic induction – intensity of magnetization - relation between B, H and M – magnetic susceptibility – magnetic permeability – their inter relation - properties of Dia, Para and Ferro magnetic materials- Hysteresis- B- G method for drawing B-H curve – energy loss due to hysteresis - Importance of hysteresis curves.
UNIT-IV	**ELECTROMAGNETIC INDUCTION AND ELCTROMAGNETISM**: Faraday and Lenz laws –vector form – self-induction – Anderson's method – self inductance of the solenoid- mutual induction – B-G method - coefficient of mutual inductance between two coaxial solenoids – coefficient of coupling - Maxwell's equations- physical significance- displacement current.

UNIT-V	**TRANSIENT AND ALTERNATING CURRENTS:** Growth and decay of current in a circuit containing resistance and inductance – growth and decay of charge in a circuit containing resistance and capacitor – growth and decay of charge in an LCR series circuit (expressions for charge only) – peak, average and rms values of ac – power in an AC circuit- Power factor- watteless current- choke coil.
UNIT-VI	**PROFESSIONAL COMPONENTS**:expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1. Murugeshan. R., - Electricity and Magnetism, 8thEdn, 2006, S.Chandand Co, New Delhi.\ 2. Sehgal D.L., Chopra K.L, Sehgal N.K., - Electricity and Magnetism, Sultan Chand and Sons, New Delhi. 3. M. Narayanamurthy and N. Nagarathnam, Electricity and Magnetism, 4th Edition. National Publishing Co., Meerut.
REFERENCE BOOKS	1. 1. Brijlal and Subramanian, Electricity and Magnetism, 6th Edn.,Ratanand Prakash, Agra. 2. Brijlal, N.Subramanyan and JivanSeshan, Mechanics and Electrodynamics (2005), Eurasia Publishing House (Pvt.) Ltd., New Delhi. 3. David J. Griffiths, Introduction to Electrodynamics, 2ndEdn. 1997, Prentice Hall of India Pvt. Ltd., New Delhi 4. D. Halliday, R. Resnik and J. Walker - Fundamentals of Physics, 6thEdn., Wiley, NY, 2001.
WEB RESOURCES	https://www.edx.org/course/electricity https://www.udemy.com/courses/ electricity https://www.edx.org/course/magnetism http://www.hajim.rochester.edu/optics/undergraduate/courses.html

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSEOUTCOMES	**CO1**	Describe various thermo-electric effects and their properties.
	CO2	Apply Biot and Savart law to study the magnetic effect of electric current.
	CO3	To study the concepts of magnetism and the properties of magnetic materials.
	CO4	Use Faraday and Lenz laws in explaining self and mutual inductance.
	CO5	Analyze the time variation of current and potential difference in AC circuits

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)**for each course with program out comes **(PO)**in the 3-point scale of STRONG(**S**),MEDIUM(**M**)andLOW(**L**).

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

COURSE	FIFTH SEMESTER – CORE-CC6
COURSE TITLE	ATOMIC AND NUCLEAR PHYSICS
CREDITS	4
COURSE OBJECTIVES	To make students understand the development of atom models, quantum numbers, coupling schemes and analysis of magnetic moments of an electrons; To gain knowledge on excitation and ionization potentials, splitting of spectral lines in magnetic and electric fields; To get knowledge on radioactive decay; To know the concepts used in nuclear reaction; to understand the quark model of classification of elementary particles.
UNITS	COURSE DETAILS
UNIT-I	**VECTOR ATOM MODEL:** Vector atom model – electron spin –spatial quantisation– quantum numbers associated with vector atom model – L-S and J-J coupling – Pauli's exclusion principle – electronic configuration – Bohr magnetron – Stern -Gerlach experiment – selection rules – intensity rule.
UNIT-II	**ATOMIC SPECTRA**: Origin of atomic spectra – excitation and ionization potentials – Davis and Goucher's method – spectral terms and notations – fine structure of sodium D-lines – Zeeman effect –Larmor's theorem – quantum mechanical explanation of normal Zeeman effect – anomalous Zeeman effect (qualitative explanation) –Paschen-Back effect – Stark effect.
UNIT-III	**RADIOACTIVITY**: Discovery of radioactivity – natural radio activity – properties of alpha rays, beta rays and gamma rays – Geiger-Nuttal law – alpha particle spectra –Gammow's theory of alpha decay (qualitative study) – beta ray spectra – neutrino theory of beta decay – nuclear isomerism – internal conversion.
UNIT-IV	**NUCLEAR REACTIONS**: Conservation laws of nuclear reaction – Q-value equation for a nuclear reaction – threshold energy – scattering cross section – artificial radio activity – application of radio isotopes – classification of neutrons – models of nuclear structure – liquid drop model – shell model.
UNIT-V	**ELEMENTARY PARTICLES**: Classification of elementary particles – fundamental interactions – elementary particle quantum numbers –iIsospin and strangness quantum number – Conservation laws and symmetry – quarks – quark model (elementary ideas only) – discovery of cosmic rays – primary and secondary cosmic rays – latitude effect– altitude effect.
UNIT-VI	**PROFESSIONAL COMPONENTS**: expert lectures –seminars — webinars – industry inputs – social accountability – patriotism

TEXT BOOKS	1. R. Murugesan, Modern Physics, S. Chand and Co. (All units) (Units IandII-Problems) 2. Brijlal and N. Subrahmanyam, Atomic and Nuclear Physics, S. Chand and Co. (All units) 3. J. B. Rajam, Modern Physics, S. Chand and Co. 4. Sehgal and Chopra, Modern Physics, Sultan Chand, New Delhi 5. Arthur Beiser– Concept of Modern Physics, McGraw Hill Publication, 6th Edition.
REFERENCE BOOKS	1. Perspective of Modern Physics, Arthur Beiser, McGraw Hill. 2. Modern Physics, S. Ramamoorthy, National Publishing and Co. 3. Laser and Non-Linear Optics by B.B.Laud, Wiley Easter Ltd.,New York,1985. 4. Tayal, D.C.2000 – Nuclear Physics, Edition, Himalaya Publishing House, Mumbai. 5. Irving Kaplan (1962) Nuclear Physics, Second Edition, Oxford and IBH Publish and Co, New Delhi. 6. J.B. Rajam– Atomic Physics, S. Chand Publication, 7th Edition. 7. Roy and Nigam, – Nuclear Physics (1967) First edition, Wiley Eastern Limited, New Delhi.
WEB RESOURCES	1. http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html 2. https://makingphysicsfun.files.wordpress.com/2015/01/photoelectric-effect.pptx 3. https://www.khanacademy.org/science/physics/quantum-physics/in-in-nuclei/v/types-of-decay 4. https://www.khanacademy.org/science/in-in-class-12th-physics-india/nuclei

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Understand the vector atom model and know the different quantum numbers are associated with it**.** To acquire the knowledge on electronic configuration and to study the Bohr magneton .
	CO2	To learn the excitation and ionization potential with experiments and to study the normal and anomalous Zeeman effect with quantum mechanical explanation. Analyze the paschen-Back and stark effect
	CO3	To know the basic concepts of radioactivity and to study the alpha, beta and gamma decays
	CO4	This unit explores the nuclear reaction and its conservation laws and to analyze the different nuclear models.
	CO5	To analyze the elementary particles and its fundamental interactions and to know about the quarks models, cosmic rays

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)**for each course with program out comes **(PO)**in the3-point scale of STRONG(**S**),MEDIUM(**M**) and LOW(**L**).

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

COURSE	FIFTH SEMESTER – CORE- CCVI
COURSETITLE	ANALOG AND COMMUNICATION ELECTRONICS
CREDITS	3
COURSE OBJECTIVES	To study the design, working and applications of semiconducting devices. To construct various electronic circuits. To study them in details. To study the basis of audio and video communication systems and the aspects of satellite and FibreOptic Communications.

UNITS	COURSE DETAILS
UNIT-I	**DIODES:** Diode characteristics – rectifiers - clipper circuits, clamping circuits. half wave rectifier, center tapped and bridge full wave rectifiers, calculation of efficiency and ripple factor. Zener diode- characteristics – zener diode as voltage regulator.
UNIT-II	**TRANSISTOR AMPLIFIERS:** Transistor configurations: CB, CE modes – I-V characteristics and hybrid parameters – DC load line – Q point self-bias – RC coupled CE amplifier –power amplifiers – classification of power amplifiers: A, B, C – push pull amplifiers – tuned amplifiers.
UNIT-III	**TRANSISTOR OSCILLATORS:** Barkhausen's criterion. Transistor oscillators: Hartely, Colpitt, Phase shift oscillators feedback amplifier - principle of feedback, positive and negative feedback of voltage and current gain, advantages of negative feedback.
UNIT-IV	**OPERATIONAL AMPLIFIERS:** differential amplifiers **–** OPAMP characteristics –IC 741 pin configuration **–** inverting and non-inverting amplifiers – unity follower –adder and subtractor– differentiator and integrator – astable multivibrator (square wave generator) – mono stable vibrator
UNIT-V	**MODULATION AND DEMODULATION t**heory of amplitude modulation - frequency modulation – comparison of AM and FM – phase modulation – sampling theorem – pulse width modulation – pulse modulation systems: PAM, PPM, and PCM – demodulation: AM and FM detection - super heterodyne receiver (block diagram)
UNIT-VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars – – webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1. V.K.Mehta - Principles of Electronics, S.Chand and Co. Ltd., 2004. 2. V.Vijayendran - Integrated Electronics, S.Vishwanathan Publishers, Chennai. 3. B.L. Theraja - A Text Book of Electrical Technology.

	4. John D. Ryder - Electronic fundamentals and Applications. 5. Malvino - Electronic Principles, Tata McGraw Hill.
REFERENCE BOOKS	1. B. Grob - Basic Electronics, 6th edition, McGraw Hill, NY, 1989. 2. Herbert Taub and Donald schilling - Digital Integrated Electronics, McGraw Hill, NY. 3. Ramakant A. – Op amp principles and linear integrated circuits, Gaykward 4. Bagde and S. P. Singh - Elements of Electronics. 5. Millman and Halkias- Integrated Electronics, Tata McGraw Hill.
WEB RESOURCES	1. https://www.queenmaryscollege.edu.in/eresources/undergraduateprogram/py157 2. www.ocw.mit.edu>...> Circuits and Electronics 3. www.ocw.mit.edu>...> Introductory Analog Electronics Laboratory 4. https:// www.elprocus.com> semiconductor devices 5. https:// www.britannica.com>technology

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSEOUTCOMES	**CO1**	Explain the basic concepts of semiconductors devices.
	CO2	know and classify the basic principles of biasing and transistor amplifiers
	CO3	Acquire the fundamental concepts of oscillators.
	CO4	Understand the working of operational amplifiers
	CO5	Learn and analyze the operations of sequential and combinational digital circuits

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)**for each course with program out comes **(PO)** in the 3-point scale of STRONG(**S**),MEDIUM(**M**)andLOW(**L**).

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

COURSE	**FIFTH SEMESTER – CORE PRACTICAL 5**
COURSETITLE	**PRACTICAL 5**
CREDITS	3
COURSE OBJECTIVES	Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results.

GENERAL

Minimum of TWELVE Experiments from the list:

1. Diffraction grating Normal incidence.
2. Diffraction grating minimum deviation.
3. Thickness of a thin film of Bi-prism
4. Brewster's law – polarization
5. Dispersive power of plane diffraction grating.
6. Forbe's method – Thermal conductivity of a metal rod.
7. Spectrometer– Grating - Normal incidence - Wave length of Mercury spectral lines.
8. Spectrometer – Grating - Minimum deviation - Wave length of Mercury spectral lines.
9. Spectrometer – (i-d) curve.
10. Spectrometer – (i-i′) curve.
11. Spectrometer – Narrow angled prism.
12. Rydberg's constant
13. e/m Thomson method
14. h by photocell
15. Spectral response of photo conductor (LDR).
16. Potentiometer –Resistance and Specific resistance of the coil.
17. Potentiometer – E.M.F of a thermocouple.
18. Carey Foster's bridge - Temperature coefficient of resistance of the coil.
19. Deflection Magnetometer – Determination of Magnetic moment of a bar magnet and $B_H$using circular coil carrying current.
20. Vibration magnetometer - Determination of B_H using circular coil carrying current– Tan B position.
21. B.G – Figure of Merit – Charge Sensitivity

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

NUMERICAL METHODS AND C PROGRAMMING –EC-I	
Learning Objective: To understand the methods in numerical differentiation and integration andto develop the problem solving skills of the student. To introduce and explain the basic structure, rules of compiling and execution of C programming.	
UNITS	**COURSE DETAILS**
UNIT-I	**NUMERICAL SOLUTIONS:** Determination of zeros of polynomials – roots of linear and nonlinear algebraic and transcendental equations – bisection and Newton-Raphson methods – convergence and divergence of solutions
UNIT-II	**NUMERICAL DIFFERENTIATION, INTEGRATION AND CURVE FITTING:** Principle of least squares – fitting a straight line and exponential curve - Newton's forward and backward interpolation – Lagrange's interpolation – Newton-Raphson method to find square root and cube roots –trapezoidal rule – Simpson's 1/3 and 1/8 rule.
UNIT-III	**INTRODUCTION TO C**: Importance of C- basic structure of C Programming - Algorithm – Flow Chart – constants, variables and data types – character set, key words and identifiers –declaration of variables and data types – operators – expressions: arithmetic, Relational, Logical – Increment and decrement – Conditional – comma operators.
UNIT-IV	**CONTROL STRUCTURE, ARAAYS AND FUNCTIONS:** I/O statements: getchar – putchar – formatted input (scanf), formateed output (printf) – Control structures: Decision making if, if-else, nested if – switch – goto- break – continue – while , do while, for statements – Arrays: One dimensional and two dimensional arrays – String: Declaring and initializing string – string handling functions – Functions: Library functions and user defined functions.
UNIT-V	**POINTERS AND PROGRAM: Pointers:** Accessing the address of variables – Declaring and initializing – Accessing a variable through its pointer – Pointer expression – Pointer arithmetic – Increments and scale factor – Pointers and arrays – Pointers and functions. **Development of Algorithm, Flowchart and Program:** 1. Area of a Triangle for the given two & three sides. 2. Calculation of Compound Interest.

	3. Conversion of Fahrenheit to Kelvin and Centigrade. 4. Solving quadratic equation. 5. Picking the Largest & Smallest of N numbers.
TEXT BOOKS	1. Numerical methods, Singaravelu, Meenakshi publication,4th Edn., 1999. 2. Numerical methods P.Kandasamy, K.Thilagavathy, K. Gunavathi, S.Chand, 2016 3. Programming in C, Balagurusamy, TMG, ND, 2012 4. Numerical Analysis,, M.K.Venkatraman, NPH, 2013 **5.** Numerical Analysis, B.D.Gupta, Konark Publishers, New Delhi, 2013
REFERENCE BOOKS	1. Schaum's outline series, Theory and Problems of programming in C, C.Byronand S. Gottfried, Tata McGraw Hill 2003 2. Numerical methods and C Programming, Veerarajan, 2015.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUT COMES	**CO1**	Explain the concepts of numerical solutions.
	CO2	To learn the ideas on Numerical differentiation, integration and curve fitting
	CO3	To learn the fundamentals of Clanguage
	CO4	Acquire the fundamental concepts Arrays and functions in C language
	CO5	Describe the Pointers and program and apply the concepts in program

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)** for each course with program outcomes **(PO)** in the3-point scale of STRONG(**S**), MEDIUM (**M**) and LOW (**L**).

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

LASERS AND FIBER OPTICS-EC-II	
Learning Objective: The students will learn the fundamentals, types of lasers, laser instrumentation and their applications also the interconnect between optics with lasers.	
UNITS	**COURSE DETAILS**
UNIT-I	**FUNDAMENTALS OF LASER:** basic principles: spontaneous and stimulated emission – Einstein's coefficient – pumping mechanism: optical, electrical and laser pumping – population inversion – two and three level laser system – resonator configuration – quality factor – threshold condition – concept of Q switching–Theory of mode locking– cavity dumping.
UNIT-II	**TYPES OF LASER: s**olid state laser: ruby laser, Nd:YAGlaser, Nd:Glasslaser – dye laser – chemical laser: HCL laser, CO chemical laser. Gas laser: neutral atom gas laser (He-Ne laser), CO_2laser, Copper vapour laser.
UNIT-III	**APPLICATIONS OF LASER:** Application of laser in metrology – optical communication – material processing: laser instrumentation of material processing, powder feeder, laser heating, laser welding, laser melting – medical application – Laser instrumentation for surgeries– laser in astronomy.
UNIT-IV	**FIBEROPTICS:** Basic components of optical fiber communication – principles of light propagation through fiber – total internal reflection-types of fiber: single mode and multi-mode fiber – step index and graded index fiber – coherent bundle – numerical aperture and acceptance angle – phase shift and attenuation during total internal reflection.
UNIT-V	**CHARACTERISTICS ANDFABRICATION OF OPTICAL FIBER:** Fiber characteristics: mechanical and transmission characteristics – absorption loss and scattering loss measurements – dispersion – connectors and splicers – fiber termination – optical time domain reflectometer(OTDR) and its uses – fiber fabrication – double crucible method.
TEXT BOOKS	1. B.B. Laud - Laser and Non-linear Optics, New Age International Publications Third Edition, New Delhi. 2. An Introduction to laser, theory and applications by Avadhunulu, M.N.S.,Chand and Co, New Delhi 3. J. Wilson and J.F.B. Hawkes. 'Introduction to Opto Electronics', Pearson Education, 2018.
REFERENCE BOOKS	1. A.Sennaroglu,"PhotonicsandLaserEngineering:Principles,Devicesa ndApplications"McGraw-HillEducation,2010. 2. K.R.Nambiar, "Lasers: Principles, Typesand Applications", New Age International, 2004. 3. Optic, Ajoy Ghatak, McGraw-Hill Education (India) Pvt, Ltd, 6th Edn., 2017.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUT COMES	**CO1**	To acquire the knowledge of fundamentals of laser
	CO2	To learn the ideas of various types of lasers
	CO3	To understand the applications of lasers in various fields
	CO4	Acquire the fundamental concepts optical fiber
	CO5	To learn the characteristics and the fabrication of optical fiber

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)**for each course with program outcomes **(PO)** inthe3-point scale of STRONG(**S**),MEDIUM(**M**)andLOW(**L**).

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

COURSE	SIXTHSEMESTER – CORE –CCVIII
COURSETITLE	QUANTUM MECHANICS AND RELATIVITY
CREDITS	4
COURSE OBJECTIVES	To understand the theory of relativity, its postulates and the consequences. To learn the importance of transformation equations and also to differentiate between special and general theory of relativity. To interpret the wave theory of matter with various theoretical and experimental evidences. To derive and use Schrodinger's wave equation and also learn about various operators. To solve Schrodinger's wave equation for simple problems and analyse to understand the solutions.

UNITS	COURSE DETAILS
UNIT-I	**SPECIAL THEORY OF RELATIVITY:** Michelson-Morley experiment–frames of reference – Galilean Relativity – postulates of special theory of relativity – Lorentz transformation – consequences – time dilation – length contraction–variation of mass with velocity – Einstein's mass-energy relation– relativistic momentum – energy relation
UNIT-II	**ORIGIN OF QUANTUM THEORY:** Failure of classical physics- Planck's quantum theory of radiation- Black body radiation- Planck's law- Einstein's photo electric equation- Compton effect-Wavelength separation Bohr's quantization of angular momentum.
UNIT-III	**MATTER WAVES:** De Broglie's hypothesis for matter waves- Expression foe wave lengths – phase velocity and group velocity and their inter relation–Davisson and Germer's experiment –G.P Thomson experiment – general uncertainty principle – examples – illustration of Gamma ray microscope.
UNIT-IV	**OPERATORS AND SCHRÖDINGER EQUATION:** postulates of quantum mechanics – Physical significance of Wave function– Schrödinger's equation –time dependent- time independent- linear operators – Hermitian operator – properties of Hermitian operator – operators for position, linear Momentum, angular momentum components – commutator between these operators –expectation values of position and momentum –Ehren fest theorem.
UNIT-V	**SOLVING SCHRÖDINGER EQUATION FOR SIMPLE PROBLEMS:** Eigen value and Eigen function- Normalised and orthogonal functions- *one-dimensional problems*: (i) particle in a box, (ii) barrier penetration problem – quantum mechanical tunneling, (iii) linear harmonic oscillator. (iv) square well potential
UNIT-VI	**PROFESSIONAL COMPONENTS:**expert lectures –seminars — webinars – industry inputs – social accountability – patriotism

TEXT BOOKS	1. Modern Physics, R. Murugeshan, KiruthigaSivaprasath,S. Chand and Co.,17th Revised Edition, 2014. 2. Concepts of Modern Physics, A.Beiser, 6th Ed., McGraw-Hill, 2003. 3. Special Theory of Relativity,S. P.Puri, Pearson Education, India, 2013. 4. Quantum Mechanics, GhatakandLoganathan, Macmillan Publications. 5. Quantum mechanics – Satyaprakash and Swati Saluja. KedarNath Ram Nathand Co.
REFERENCE BOOKS	1. Fundamentals of Modern Physics, Peter J. Nolan, 1stEdition, 2014, by Physics 2. Quantum Mechanics, V. Devanathan, Narosa Pub. House, Chennai, 2005. 3. Quantum Mechanics, V.K. Thangappan, New Age International, New Delhi. 4. A Text Book of Quantum Mechanics, Mathews andVenkatesan, Tata McGraw Hill, New Delhi. 5. Introduction to Quantum Mechanics, Pauling and Wilson, McGraw Hill Co., NewYork.
WEB RESOURCES	1. http://hyperphysics.phy-astr.gsu.edu/hbase/qapp.html 2. https://swayam.gov.in/nd2_arp19_ap83/preview 3. https://swayam.gov.in/nd1_noc20_ph05/preview 4. https://www.khanacademy.org/science/physics/special-relativity/minkowski-spacetime/v/introduction-to-special-relativity-and-minkowski-spacetime-diagrams

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUT COMES	**CO1**	Understand various postulates of special theory of relativity.
	CO2	Understand the basic concepts of quantum theory of radiations
	CO3	Realize the wave nature of matter and understand its importance
	CO4	Derive Schrodinger equation and also realize the use of operators.
	CO5	Apply Schrödinger equation to simple problems.

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)**for each course with program out comes **(PO)**in the 3-point scale of STRONG(**S**),MEDIUM(**M**)and LOW(**L**).

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

COURSE	SIXTH SEMESTER – CORE- CCIX
COURSE TITLE	SOLID STATE PHYSICS
CREDITS	4
COURSE OBJECTIVES	To understand the crystal structures and the experimental methods in x ray diffraction. To learn the lattice heat capacity and electrical and thermal conductivity of material. To gain the knowledge on magnetic properties of solids and to acquire the knowledge of dielectric properties of materials. To learn the band theory of solids and superconductivity of materials.

UNITS	COURSE DETAILS
UNIT-I	**CRYSTAL STRUCTURE:** Crystal lattice – lattice translational vectors – lattice with basis – unit cell – Bravais' lattices – Miller indices – procedure for finding them –packing of SCC,BCC and FCC structures – structures of NaCl and diamond crystals – reciprocal lattice – X-ray diffraction – Bragg's law– experimental methods: Laue method, powder method .
UNIT-II	**LATTICE HEAT CAPACITY:** Phonon – Introduction-Dulong and Petit's Law – Einstein and Debye theories of specific heat of solids – T^3 law (qualitative only)–properties of metals – classical free electron theory of metals (Drude-Lorentz) – Ohm's law – electrical and thermal conductivities – Weidemann-Franz' law .
UNIT-III	**MAGNETIC PROPERTIES OF SOLIDS:** Permeability, susceptibility, relation between them – classification of magnetic materials –Langevin'stheory of diamagnetism – Langevin'stheory of paramagnetism – Curie-Weiss law – Weiss theory of ferromagnetism(qualitative only) – Heisenberg's quantum theory of ferromagnetism – domains – discussion of B-H curve –hysteresis and energy loss – soft and hard magnets.
UNIT-IV	**DIELECTRIC PROPERTIES OF MATERIALS:** polarization and electric susceptibility –local electric field of an atom – dielectric constant and polarisability – polarizability processes: electronic polarization– calculation of polarisability – ionic, orientational and space charge polarization –internal field –Clausius -Mosotti relation – frequency dependence of dielectric constant –dielectric loss – effect of temperature on dielectric constant – dielectric breakdown and its types.
UNIT-V	**BAND THEORY AND SUPER CONDUCTIVITY:** Band theory of conductor, semiconductor (P and N type) and insulator – conductivity of semiconductor – mobility – Hall effect – measurement of conductivity (four probe method) - Hall coefficient.

	Superconductivity: experimental results –critical temperature – critical magnetic field – Meissner effect –type-I and type-II superconductors – London's equation and penetration depth – isotope effect – idea of BCS theory (no derivation)
UNIT-VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1. Introduction to Solid State Physics,Kittel, Willey Eastern Ltd (2003). 2. Solid state Physics, Rita John,1st edition, TataMcGraw Hill publishers (2014). 3. Solid State Physics , R L Singhal, Kedarnath Ram Nathand Co., Meerut (2003) 4. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India 5. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill 6. Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning 7. Solid-state Physics, H. Ibach and H. Luth, 2009, Springer 8. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India 9. Solid State Physics, M.A. Wahab, 2011, Narosa Publishing House, ND
REFERENCE BOOKS	1. PuriandBabber – Solid State Physics – S.ChandandCo. New Delhi. 2. Kittel - Introduction to solid state physics, Wiley and Sons, 7th edition. 3. Raghavan - Materials science and Engineering, PHI 4. Azaroff - Introduction to solids, TMH 5. S. O. Pillai - Solid State Physics, Narosa publication 6. A.J. Dekker - Solid State Physics, McMillan India Ltd. 7. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India
WEB RESOURCES	1. https://nptel.ac.in/courses/115105099/ 2. https://nptel.ac.in/courses/115106061/

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUT COMES	**CO1**	Classify the bonding and crystal structure also learn about the crystal structure analysis using X ray diffraction.
	CO2	Understand the lattice heat capacity and thus learn the electrical and thermal properties of materials.
	CO3	Give reason for classifying magnetic material on the basis of their behavior.
	CO4	Comprehend the dielectric behavior of materials.
	CO5	Appreciate the super conducting properties of materials.

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)** for each course withprogram out comes **(PO)** in the 3-point scale of STRONG(**S**),MEDIUM (**M**) and LOW(**L**).

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

COURSE	SIXTH SEMESTER – CORE PRACTICAL 6
COURSETITLE	PRACTICAL 6
CREDITS	3
COURSE OBJECTIVES	To perform basic experiments on characteristics of electronic devices and then get into the applications such as amplifiers, oscillators, counters, multivibrators. Perform fundamental experiments on microprocessor 8085 and learn to write programs by themselves.

Electronics

Minimum of TWELVE Experiments from the list:

1. Zener diode – voltage regulations
2. Bride rectifier using diodes
3. Characteristics of a transistor – (CE mode)
4. Characteristics of a transistor – (CB mode)
5. Colpitt's oscillator -transistor.
6. Hartley oscillator - transistor.
7. Astablemultivibrator - transistor.
8. Bistablemultivibrator - transistor.
9. FET - characteristics.
10. FET - amplifier (common drain)
11. UJT -characteristics
12. AC circuits with L,C,R -Series resonance.
13. AC circuits with L,C,R - Parallel resonance.
14. Operational amplifier - inverting amplifier and summing.
15. Operational amplifier - non-inverting amplifier and summing.
16. Operational amplifier – differential amplifier
17. Operational amplifier - differentiator and integrator.
18. Operational amplifier - D/A converter by binary resistor method.
19. 5V, IC Regulated power supply.
20. Construction of seven segment display.
21. Study of gate ICs – NOT, OR, AND, NOR, NAND, XOR, XNOR
22. Verification of De Morgan's theorem using ICs –NOT, OR, AND
23. NAND as universal building block.
24. NOR as universal building block.
25. Half adder / Half subtractor using basic logic gate ICs
26. Microprocessor 8085 – addition (8 bit only)
27. Microprocessor 8085 – subtraction (8 bit only)
28. Microprocessor 8085 – multiplication (8 bit only)
29. Microprocessor 8085 – division (8 bit only)
30. Microprocessor 8085 – largest/smallest of numbers (8 bit only)
31. Microprocessor 8085 –ascending/descending order

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE	SIXTH SEMESTER –EC-III
COURSETITLE	DIGITAL ELECTRONICS AND MICROPROCESSOR 8085
CREDITS	3
COURSE OBJECTIVES	To learn all types of number systems, Boolean algebra and identities, digital circuits for addition and subtraction, flip-flops, registers, counters. To get the knowledge on fundamentals of 8085 architecture, instruction sets and simple programs.
UNITS	COURSE DETAILS
UNIT-I	**NUMBER SYSTEMS AND GATES**: Decimal, binary, octal, hexadecimal numbers systems and their conversions – codes: BCD code –binary addition, binary subtraction using 1's and 2's complement methods – Boolean laws – De-Morgan's theorem –basic logic gates -universal logic gates (NAND and NOR) –standard representation of logic functions (SOP and POS) – minimization techniques (Karnaughmap: 2, 3, 4 variables, SOP only).
UNIT-II	**COMBINATIONALLOGIC SYSTEMS**: Half and full adder – half and full subtractor –parallel binary adder – multiplexers (4:1) and demultiplexers (1:4), encoder (8-line-to-3- line) and decoder (3-line-to-8-line), BCD to seven segment decoder.
UNIT-III	**SEQUENTIAL LOGIC SYSTEMS**: Flip-flops: S-R Flip-flop , J-K Flip-flop, T and D type flip-flops, master-slave flip-flop, registers:- serial in serial out and parallel in and parallel out – counters - asynchronous:-mod-8 - synchronous - 4-bit ring counter –memory addressing , ROM, RAM (static and dynamic), PROM, EPROM, EEPROM.
UNIT-IV	**DATA CONVERTERS**: D/A Converters: Basic Ideas – Resolution and accurucay – 4 bit binary weighted D/A Converters.-Binary Ladder D/A Converter. A/D Converters: Basic Ideas – Resolution and accuracy – Dual Slope A/D Converter – Counter type A/D Converter.
UNIT-V	**8085 MICROPROCESSOR**: Introduction to microprocessor – INTEL 8085 architecture – register organization –pin configuration of 8085,–instruction set of 8085 –addressing modes of 8085 – assembly language programming using 8085 –programmes for addition (8-Bit), subtraction (8-Bit), multiplication (8- Bit), division (8- Bit) – largest and smallest number in an array.
UNIT-VI	**PROFESSIONAL COMPONENTS**: expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1. M.Morris Mano, "Digital Design "3rd Edition, PHI, NewDelhi. 2. Ronald J. Tocci. "Digital Systems-Principles and Applications"

	6/e. PHI. New Delhi. 1999.(UNITS I to IV) 3. S.Salivahanaand S. Arivazhagan-Digital circuits and design 4. Microprocessor Architecture, Programming and Applications with the 8085 – Penram International Publishing, Mumbai.- Ramesh S.Gaonakar 5. Microcomputer Systems the 8086/8088 family – YU-Cheng Liu and GlenSA
REFERENCE BOOKS	1. Herbert Taub and Donald Schilling. "Digital Integrated Electronics" . McGraw Hill. 1985. 2. S.K. Bose. "Digital Systems". 2/e. New Age International.1992. 3. D.K. Anvekar and B.S. Sonade. "Electronic Data Converters: Fundamentals andApplications". TMH.1994. 4. Malvino and Leach. "Digital Principles and Applications". TMG HillEdition 5. Microprocessors and Interfacing – Douglas V.Hall 6. Microprocessor and Digital Systems – Douglas V.Hall
WEB RESOURCES	1. https://youtu.be/-paFaxtTCkI 2. https://youtu.be/s1DSZEaCX_g

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Learn about number systems, Boolean algebra, logical operation and logic gates
	CO2	Understand the working of adder, subractors, multiplexers and demultiplexers.
	CO3	Get knowledge on flip-flops and storage devices.
	CO4	Understand the operations of converters
	CO5	Gain inputs on architecture of microprocessor 8085

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)** for each course with program out comes **(PO)** in the 3-point scale of STRONG(**S**),MEDIUM(**M**)andLOW(**L**).

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

COURSE	SIXTH SEMESTER – EC-IV
COURSETITLE	NANOSCIENCE AND NANO TECHNOLOGY
CREDITS	3
COURSE OBJECTIVES	**Learning Objective:** This course aims to provide an overall understanding of Nanoscience and Nanotechnology and introduces different types of nanomaterials, their properties, fabrication methods, characterization techniques and a range of applications.
UNITS	**COURSE DETAILS**
UNIT-I	**NANOSCIENCE AND NANOTECHNOLOGY:** Nanoscale– nanostructures: 0D, 1D,2D– surface to volume ratio– size effect – excitons – quantum confinement– metal based nanoparticles (metal and metal oxide) – carbon nanostructures – fullerene –SWCNT and MWCNT
UNIT-II	**PROPERTIES OF NANOMATERIALS:** Introduction – mechanical behavior – elastic properties – hardness and strength – ductility and toughness –super plastic behavior – optical properties – surface plasmon resonance – electrical properties – dielectric materials and properties – magnetic properties – super paramagnetism – electrochemical properties – properties of CNTs.
UNIT-III	**FABRICATION METHODS AND VACUUM TECHNIQUES:** Top-down and Bottom-up approaches – electrochemical method – plasma arc discharge – thermal evaporation – pulsed laser deposition – ball milling – lithography: photolithography – e-beam lithography – sol-gel methods – synthesis of CNT.
UNIT-IV	**CHARACTERIZATION TECHNIQUES:** Atomic force microscopy – scanning electron microscopy – transmission electron microscopy – powder XRD method: determination of structure and grain size analysis – UV-visible and photoluminescence spectroscopy.
UNIT-V	**APPLICATIONS OF NANOMATERIALS:** Medicine: drug delivery – photodynamic therapy – molecular motors –energy: fuel cells – rechargeable batteries sensors: nano sensors based on optical and physical properties – electrochemical sensors – nano biosensors.
TEXT BOOKS	1. K.K.Chattopadhyay and A.N.Banerjee, (2012), Introduction to Nanoscience and Nanotechnology, PHI Learning Pvt. Ltd., 2. M.A. Shah, Tokeer Ahmad (2010), Principles of Nanoscience and Nanotechnology, Narosa Publishing House Pvt Ltd. **3.** Mick Wilson, et al (2005) Nanotechnology, Overseas Press**.**
REFERENCE BOOKS	1. Richard Booker and Earl Boysen, (2005) Nanotechnology, Wiley Publishing Inc. USA 2. J.H.Fendler (2007) Nano particles and nano structured films; Preparation, Characterization and Applications, John Wiley and Sons **3.** B.S.Murty, et al (2012) Textbook of Nanoscience and Nanotechnology, Universities Press.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	To Learn about the fundamental concepts of nanoscience and nano technology
	CO2	Understand the properties of nanomaterials
	CO3	Discuss the different fabrication method in top-down and bottom up approaches.
	CO4	To analyze the different characterization techniques for synthesized nanomaterial
	CO5	Study the applications of nanomaterials in various fields

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)** for each course with program out comes **(PO)** in the 3-point scale of STRONG(**S**),MEDIUM(**M**)andLOW(**L**).

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

COURSE	ALLIED PAPER
COURSE TITLE	**ALLIED PHYSICS – I**
CREDITS	3
COURSE OBJECTIVES	To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.
UNITS	**COURSE DETAILS**
UNIT-I	**WAVES, OSCILLATIONS AND ULTRASONICS:** simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezo electric method – application of ultrasonics.
UNIT-II	**PROPERTIES OF MATTER**: Elasticity: elastic constants – bending of beam – theory of non- uniform and uniform bending – determination of Young's modulus by non-uniform and uniform bending . Viscosity: streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille's formula – comparison of viscosities – burette method. Surface tension: Definition – molecular theory – droplets formation.
UNIT-III	**HEAT AND THERMODYNAMICS**: Joule-Kelvin effect – Joule-Thomson effect- porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen– Linde's process of liquefaction of air – laws of thermodynamics – heat engine – Carnot's cycle – efficiency – entropy.
UNIT-IV	**ELECTRICITY AND MAGNETISM**: potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart's law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit.
UNIT-V	**DIGITAL ELECTRONICS** :logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan's theorem – verification .
UNIT-VI	PROFESSIONAL COMPONENTS:expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1. R.Murugesan (2001), AlliedPhysics,S. ChandandCo,NewDelhi. 2. BrijlalandN.Subramanyam (1994), WavesandOscillations,VikasPublishing House,NewDelhi. 3. BrijlalandN.Subramaniam (1994), PropertiesofMatter,S.ChandandCo.,NewDelhi.

	4. J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8th edition), S.ChandandCo.,New Delhi. 5. R.Murugesan(2005), OpticsandSpectroscopy,S.ChandandCo,NewDelhi. 6. A.Subramaniyam, AppliedElectronics2ndEdn.,NationalPublishingCo.,Chennai.
REFERENCEBOOKS	1. ResnickHallidayandWalker(2018).FundamentalsofPhysics(11th edition),JohnWilleyand Sons, Asia Pvt.Ltd., Singapore. 2. V.R.KhannaandR.S.Bedi (1998), TextbookofSound1stEdn. KedharnaathPublishandCo, Meerut. 3. N.S.KhareandS.S.Srivastava (1983), ElectricityandMagnetism10thEdn.,AtmaRamandSons, New Delhi. 4. D.R.KhannaandH.R. Gulati(1979). Optics,S. Chand andCo.Ltd.,New Delhi. 5. V.K.Metha(2004).Principlesofelectronics6thEdn. S.Chandandcompany.
WEB RESOURCES	1. https://youtu.be/M_5KYncYNyc 2. https://youtu.be/ljJLJgIvaHY 3. https://youtu.be/7mGqd9HQ_AU 4. https://youtu.be/h5jOAw57OXM 5. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/ 6. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://www.youtube.com/watch?v=gT8Nth9NWPMhttps://www.youtube.com/watch?v=9mXOMzUruMQandt=1shttps://www.youtube.com/watch?v=m4u-SuaSu1sandt=3shttps://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

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

COURSE OUT COMES	**CO1**	Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically.
	CO2	Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life.
	CO3	Comprehend basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology.
	CO4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlate the connection between electric field and magnetic field and analyze the mathematically verify circuits and apply the concepts to construct circuits and study them.
	CO5	Interpret the real life solutions using AND, OR, NOT basic logic gates and intend their ideas to universal building blocks. Infer operations using Boolean algebra and acquire elementary ideas of IC circuits.

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)** for each course with program out comes **(PO)** in the 3-point scale of STRONG(**S**),MEDIUM(**M**)andLOW(**L**).

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

COURSE	ODD SEMESTER - CORE
COURSETITLE	ALLIED PRACTICAL– I
CREDITS	3
COURSE OBJECTIVES	Apply various physics concepts to understand Properties of Matter and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

Minimum of Eight Experiments from the list:

1. Young's modulus by non-uniform bending using pin and microscope
2. Young's modulus by non-uniform bending using optic lever,scale and telescope
3. Rigidity modulus by static torsion method.
4. Rigidity modulus by torsional oscillations without mass
5. Surface tension and interfacial Surface tension – drop weight method
6. Comparison of viscosities of two liquids – burette method
7. Specific heat capacity of a liquid – half time correction
8. Verification of laws of transverse vibrations using sonometer
9. Calibration of low range voltmeter using potentiometer
10. Determination of thermo emf using potentiometer
11. Verification of truth tables of basic logic gates using ICs
12. Verification of De Morgan's theorems using logic gate ICs.
13. Use of NAND as universal building block.

Note : Use of digital balance permitted

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE	ALLIED PAPER
COURSETITLE	ALLIED PHYSICS –II
CREDITS	3
COURSE OBJECTIVES	To understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics.

UNITS	COURSE DETAILS
UNIT-I	**OPTICS: i**nterference – interference in thin films — air wedge – determination of diameter of a thin wire by air wedge – diffraction– normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by reflection – Brewster's law – optical activity
UNIT-II	**ATOMIC PHYSICS:** Mass number – Atomic number–Pauli's exclusion principle – electronic configuration – periodic classification of elements – Bohr magneton – Stark effect –Zeeman effect (elementary ideas only) – photo electric effect – Einstein's photoelectric equation.
UNIT-III	**NUCLEAR PHYSICS:** Nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses – nuclear fission – atom bomb – nuclear reactor – nuclear fusion – thermonuclear reactions – differences between fission and fusion.
UNIT-IV	**INTRODUCTION TO RELATIVITY**: frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence .
UNIT-V	**SEMICONDUCTOR PHYSICS:** p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment).
UNIT-VI	**PROFESSIONAL COMPONENTS:**expert lectures –seminars — webinars – industry inputs – social accountability – patriotism

TEXT BOOKS	1. R.Murugesan (2005), AlliedPhysics,S.ChandandCo,NewDelhi. 2. K.ThangarajandD.Jayaraman(2004), AlliedPhysics,PopularBookDepot,Chennai. 3. BrijlalandN.Subramanyam(2002), TextbookofOptics,S.ChandandCo,NewDelhi. 4. R.Murugesan (2005), ModernPhysics,S.ChandandCo,NewDelhi. 5. A.SubramaniyamAppliedElectronics, 2nd Edn.,NationalPublishingCo.,Chennai.
REFERENCE BOOKS	1. ResnickHallidayandWalker (2018), FundamentalsofPhysics, 11th Edn.,JohnWilleyandSons, Asia Pvt.Ltd.,Singapore. 2. D.R.KhannaandH.R. Gulati (1979).Optics, S.ChandandCo.Ltd.,New Delhi. 3. A.Beiser (1997), ConceptsofModernPhysics,TataMcGrawHillPublication,NewDelhi. 4. Thomas L. Floyd (2017), Digital Fundamentals, 11th Edn., Universal Book Stall, NewDelhi. 5. V.K.Metha(2004), Principlesofelectronics, 6th Edn. ,S.Chandand Company, New Delhi.
WEB RESOURCES	1. https://www.berkshire.com/learning-center/delta-p-facemask/https://www.youtube.com/watch?v=QrhxU47gtj4https://www.youtube.com/watch?time_continue=318andv=D38BjgUdL5Uandfeature=emb_logo 2. https://www.youtube.com/watch?v=JrRrp5F-Qu4 3. https://www.validyne.com/blog/leak-test-using-pressure-transducers/ 4. https://www.atoptics.co.uk/atoptics/blsky.htm - 5. https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects

METHOD OF EVALUATION:

Continuous InternalAssessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUT COMES:

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

COURSE OUT COMES	**CO1**	Explain the concepts of interference diffraction using principles of superposition of waves and rephrase the concept of polarization based on wave patterns
	CO2	Relate the importance of interpreting improving theoretical models based on observation.
	CO3	Analyze the different nuclear models and to understand the concepts of nuclear fission , fusion and its uses.
	CO4	To describe the basic concepts f relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and vice versa.
	CO5	Summarize the working of semiconductor devices like junction diode, Zener diode, transistors and practical devices

MAPPING WITH PROGRAM OUT COMES:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**),MEDIUM(**M**)andLOW(**L**).

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

COURSE	EVEN SEMESTER - CORE
COURSETITLE	ALLIED PRACTICAL– II
CREDITS	3
COURSE OBJECTIVES	Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

Minimum of Eight Experiments from the list:

1. Radius of curvature of lens by forming Newton's rings
2. Thickness of a wire using air wedge
3. Wavelength of mercury lines using spectrometer and grating
4. Refractive index of material of the lens by minimum deviation
5. Refractive index of liquid using liquid prism
6. Determination of AC frequency using sonometer
7. Specific resistanceof a wire using PO box
8. Thermal conductivity of poor conductor using Lee's disc
9. Determination of figure of merit table galvanometer
10. Determination of Earth's magnetic field using field along the axis of a coil
11. Characterisation of Zener diode
12. Construction of Zerner/IC regulated power supply
13. Construction of AND, OR, NOT gates using diodes and transistor
14. NOR gate as a universal building block

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE	APPLIED PAPER
COURSETITLE	APPLIED PHYSICS-I
CREDITS	4
COURSE OBJECTIVES	To summarize and give an overview of the field of Electricity and Magnetism.
UNITS	COURSE DETAILS
UNIT-I	**ELECTROSTATICS:** Gauss theorem and its applications-intensity due to charged sphere-capacitor-Principle of capacitor-Capacitors in series and parallel-Energy of a charged capacitor-Loss of energy due to the sharing of charges.
UNIT-II	**MAGNETOSTATICS:** Magnetic field- Magnetic flux density- intensity of Magnetization-Permeability-Susceptibility-Relation between them-Magnetic potential-Properties of Dia, Para and Ferromagnetic Materials-Hysteresis-B-H Curve using Ballistic Galvanometer.
UNIT-III	**CURRENT ELECTRICITY:** Laplace's law-Magnetic field intensity at a point due to a straight conductor carrying current-Circular coil-Solenoid-Force between two parallel conductors- Ohms law- Kirchhoff's law-Wheatstone's bridge-Carey Foster's bridge-Potentiometer-Measurement of current.
UNIT-IV	**ELECTROMAGNETIC INDUCTION:** Introduction-Laws of electromagnetic induction-Eddy currents - self induction - determination of self-inductance-Anderson's method- Mutual induction-Determination by B-G method –Coefficient of coupling - Transformer theory.
UNIT-V	**ALTERNATING CURRENT:** AC circuits with single and double components-Measurements of current and voltage- series and parallel resonance circuits Power in an AC circuit-Power factor derivation-Wattless current-Choke.
UNIT-VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1. Electricity and Magnetism – Brijlal & Subramaniyam, Ratan Prakashan Mandir, Agra, (1995). 2. Electricity and Magnetism- R.Murugesan, S.Chand & Company Pvt. Ltd.(2005) 3. Applied Physics –I- Sundaravelusamy

REFERENCE BOOKS	1. Electricity and Magnetism- D.L.Seghal and Chopra, Sultan Chand and Sons, New Delhi. 2. Electricity and Magnetism – M.Narayanamurthi and N.Nagaratnam
WEB RESOURCES	

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

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

COURSE OUT COMES	**CO1**	The use Gauss law and apply it to real world problems.
	CO2	Explain the basic principles of capacitors.
	CO3	Have in depth knowledge about magnetic potential and different types of magnetic materials.
	CO4	Explain the laws that underlie the properties of electric circuit element and basic principles of Potentiometer, Carey foster's bridge etc.,
	CO5	understand the operation of such as series and parallel resonance circuits.

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)** for each course with program out comes **(PO)**in the 3-point scale of STRONG(**S**),MEDIUM(**M**)and LOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**

CO1	S	S	S	S	S	S	S	S	S	S
CO2	M	S	S	S	M	S	S	S	S	M
CO3	M	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	M	S	S	S	S	S	S	S	S	S

COURSE	SEMESTER-IV
COURSETITLE	APPLIED PHYSICS -II - PRACTICAL
CREDITS	4
COURSE OBJECTIVES	• To gain in depth of knowledge regarding the Physics fundamentals. • To study the aspects related to the application side of experiments. • To understand the utility of transistor, FET and OP- Amp. • To provide hands on learning experience in understanding the basic concepts of electronic circuits.

Minimum of Twelve Experiments from the list:

1. Semiconductor Diode-Characteristics
2. Zener diode-Characteristics
3. FET Characteristics
4. Transistor Characteristics in CE mode
5. Transistor Characteristics in CB mode
6. Bridge rectifier and Zener controlled Regulated power Supply
7. Field along the axis of a coil-M and H
8. Potentiometer-Calibration of low range voltmeter
9. Potentiometer-Measurement of current
10. Carey Foster's bridge-Specific resistance
11. Post office box- Measurement of specific resistance
12. LCR Series resonance circuits
13. LCR parallel resonance circuit
14. Mathematical operators-Addition, subtraction using Op-amp
15. Logic gates (AND, OR, NOT ,NAND NOR, EX-OR) using Ics
16. NAND as universal gates.
17. NOR as universal gates
18. Verification of Demorgans theorem.
19. Half adder and Half subtractor using logic gates.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
40	**60**	**100**	

COURSE	APPLIED PAPER
COURSETITLE	APPLIED PHYSICS-II
CREDITS	4
COURSE OBJECTIVES	To summarize and give an overview of the field of Digital Electronics.
UNITS	COURSE DETAILS
UNIT-I	**TRANSISTORS**: Working of PNP and NPN Transistors – DC characteristics of CE and CB configuration – Hybrid parameters – qualitative only – Functions of transistors as an amplifier and oscillator – FET-Construction and Working –Characteristics- FET amplifier
UNIT-II	.**OPERATIONAL AMPLIFIERS:** Characteristics of ideal of Op-amp – Inverting and Non-inverting Op-amp – Differential Op-amp – CMRR – Basic uses of Op-amp as sign and scale changer, phase shifter – Integrator – Differentiator-Adder-Subtractor – A/D conversion – Counter method – Op-amp as a comparator'
UNIT-III	**NUMBER SYSTEMS AND CODES** Decimal, Binary, Octal and Hexa Decimal number systems – conversions between Decimal, Binary and Hexa decimal – Binary addition, subtraction – 8421 code – BCD code – Excess 3 code– ASCII code
UNIT-IV	**DIGITAL LOGIC CIRCUITS:** Logic gates (AND, OR, NOT, XOR ONLY) – Boolean laws – Demorgan's Theorems – Karnaugh map simplification – Three variable (SOP) – Encoder – Decoder – Half Adder and Half Subtractor –RS Flip flop.
UNIT-V	**COMBINATIONAL LOGIC CIRCUITS:** Multiplexer (4 to 1) – Demultiplexers (1 to 4) – Shift right and shift left registers- Asynchronous and synchronous counters- MOD counter- Decade counter- Up/down counter.
UNIT-VI	**PROFESSIONAL COMPONENTS:** expert lectures –seminars — webinars – industry inputs – social accountability – patriotism
TEXT BOOKS	1. The Fundamentals of Solid State Physics, Theraja, S. Chand and Co. 2. Digital Logic and Computer Design, Morris Mano, Pearson Education; 1 (2004)
REFERENCE BOOKS	1. Digital Principles and Applications, Malvino & Leach, McGraw-Hill, 5th edition (1994). 2. Electronic Devices and Circuits- Jacob Millman, Christos C. Halkias , McGraw

	Hill Education (1967).
WEB RESOURCES	

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

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

COURSE OUT COMES	**CO1**	Convert between different number systems which are used in digital communication and digital devices.
	CO2	Have a thorough knowledge of transistor and FET and its applications in Amplifier, oscillator etc.
	CO3	Analyze different type of digital electronic circuits using logic gates .
	CO4	Ability to use OP-amp as summer, subtractor, differentiator, integrator etc.
	CO5	Understand the combinational logic circuits and its applications

MAPPING WITH PROGRAM OUT COMES:

Map course out comes **(CO)**for each course with program out comes **(PO)** in the 3-point scale of STRONG(**S**),MEDIUM(**M**) and LOW (**L**).

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

COURSE	SECOND SEMESTER – SEC 1
	(Re appearance students only)
COURSE TITLE	**PHYSICS FOR EVERYDAY LIFE – 23U2PHSEC1**
CREDITS	2
COURSE OBJECTIVES	To know where all physics principles have been put to use in daily life and appreciate the concepts with a better understanding also to know about Indian scientists who have made significant contributions to Physics
UNITS	**COURSE DETAILS**
UNIT-I	**MECHANICAL OBJECTS: s**pring scales – bouncing balls –roller coasters – bicycles –rockets and space travel.
UNIT-II	**OPTICAL INSTRUMENTS AND LASER:**vision corrective lenses – polaroid glasses – UV protective glass – polaroid camera – colour photography – holography and laser.
UNIT-III	**PHYSICS OF HOME APPLIANCES:** bulb – fan – hair drier – television – air conditioners – microwave ovens – vacuum cleaners
UNIT-IV	**SOLAR ENERGY:** Solar constant – General applications of solar energy – Solar water heaters – Solar Photo – voltaic cells – General applications of solar cells.
UNIT-V	**INDIAN PHYSICIST AND THEIR CONTRIBUTIONS:** C.V.Raman, HomiJehangirBhabha, Vikram Sarabhai, Subrahmanyan Chandrasekhar, Venkatraman Ramakrishnan, Dr. APJ Abdul Kalam and their contribution to science and technology.
TEXT BOOKS	1. The Physics in our Daily Lives, UmmeAmmara, GugucoolPublishing, Hyderabad, 2019. 1. For the love of physics, Walter Lawin, Free Press, New York, 2011.edition,Vikas Publishing House. 2. R.Murugesan,2012, Properties of Matter, S.Chandand Co.

COURSE	THIRD SEMESTER – SEC 3 (Re appearance students only)
COURSE TITLE	ASTRO PHYSICS -23U3PHSEC3
CREDITS	2
COURSE OBJECTIVES	This course intends to introduce principles of astrophysics describing the science of formation and evolution of stars and interpretation of various heavenly phenomena and provide an understanding of the physical nature of celestial bodies along with the instrumentation and techniques used in astronomical research
UNITS	COURSE DETAILS
UNIT-I	**TELESCOPES:** Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes – detectors and image processing – radio telescopes – Hubble space telescope.
UNIT-II	**SOLAR SYSTEM:** Bode's law of planetary distances – meteors, meteorites, comets, asteroids – Kuiper belt – Oort cloud – detection of gravitational waves – recent advances in astrophysics.
UNIT-III	**ECLIPSES:** types of eclipses – solar eclipse – total and partial solar eclipse – lunar eclipse – total and partial lunar eclipse – transits. **THE SUN:**physical and orbital data – solar atmosphere – photosphere – chromosphere – solar corona – prominences – sunspots – 11year solar cycle – solar flares.
UNIT-IV	**STELLAR EVOLUTION:** H-R diagram – birth and death of low mass, intermediate mass and massive stars – Chandrasekar limit – white dwarfs – neutron stars – pulsars – black holes – supernovae. **GALAXIES:** classification of galaxies – galaxy clusters –interactions of galaxies, dark matter and super clusters – evolving universe.
UNIT-V	**ACTIVITIES IN ASTROPHYSICS:** (i) Basic construction of telescope (ii) Develop models to demonstrate eclipses/planetary motion (iii) Night sky observation (iv) Conduct case study pertaining to any topic in this paper (v) Visit to any one of the National Observatories Any three activities to be done compulsorily.
TEXT BOOKS	1. BaidyanathBasu, (2001). An introduction to Astrophysics, Second printing, Prentice – Hall of India (P) Ltd, New Delhi 2. K.S.Krishnaswamy, (2002), Astrophysics – a modern perspective, New Age International (P) Ltd, New Delhi. 3. Shylaja, B.S. andMadhusudan, H.R.,(1999), Eclipse: A Celestial Shadow Play, Orient BlackSwan,

COURSE	FOURTH SEMESTER – SEC 5 (Re appearance students only)
COURSE TITLE	PHYSICS OF MEDICAL INSTRUMENTS – 23U4PHSEC5
CREDITS	2
COURSE OBJECTIVES	The students will be exposed to instruments like ECG,EEG,EMG, medical imaging, diagnostic specialties, operation theater and its safety which will kindle interest to specialize in instrument servicing
UNITS	COURSE DETAILS
UNIT-I	**BIO-POTENTIALS AND ELECTRODES:** transport of ions through cell membrane- resting and action potential - Characteristics of resting potential – bio-electric potential – design of medical instruments – components of bio-medical instrumentation – electrodes – electrode potential – metal microelectrode – depth and needle electrodes – types of surface electrode – the pH electrode.
UNIT-II	**Bio-potential based Instrumentation:** Electrocardiography (ECG) – origin of cardiac action potential - ECG lead configuration –block diagram of ECG recording set up (qualitative) – Electroencephalography (EEG) – origin of EEG – action and evoked potentials - brain waves – block diagram of modern EEG set up – electromyography (EMG) – block diagram of EMG recording setup.
UNIT-III	**OPERATION THEATRE AND SAFETY:** diathermy – block diagram of the electrosurgical diathermy– shortwave, microwave, ultrasonic diathermy – ventilators – servo controlled systems –**RADIATION SAFETY:** units of radiation - pocket dosimeter – pocket type radiation alarm – thermo-luminescence dosimeter.
UNIT-IV	**MEDICAL IMAGING:** nuclear imaging technique –computer tomography (CT) – principle – mathematical basis of image construction – block diagram of CT scanner – ultrasonic imaging systems – construction of transducer – display modes – MRI principle and instrumentation.
UNIT-V	**DIAGNOSTICS AND SPECIALITIES:** X-rays in radiography – fluoroscopy – comparison– image intensifiers – angiography – applications of X-ray examination (*problems*). **LASER IN MEDICINE:** laser interactions with biomolecules – advantages of laser surgery – endoscopy – types of endoscopes with their operation (qualitative).
TEXT BOOKS	1. Biomedical Instrumentation and measurement, Leslie Cromwell, PHI, 2015 2. Medical Instrumentation, M. Arumugam, Anuradha agencies, 1992 3. Medical Electronics, M.J.Kumar Doss, Prathibha Publishers, 1987 4. Medical Physics, John R. Cameron and James G. Skofronick, Thrift books, Atlanta, 1985 5. Electronic Instruments and Instrumentation Technology, M. M.M.Anand, PHI, 2015

COURSE	FIFTH SEMESTER – SEC 6
	(Re appearance students only)
COURSE TITLE	**HOME ELECTRICAL INSTALLATION -23U5PHSEC6**
CREDITS	2
COURSE OBJECTIVES	The students will get knowledge on electrical instruments, installations and domestic wiring techniques with safety precautions and servicing.
UNITS	**COURSE DETAILS**
UNIT-I	**SIMPLE ELECTRICAL CIRCUITS: c**harge, current, potential difference, resistance – simple electrical circuits – DC ammeter, voltmeter, ohmmeter – Ohm's law – difference between DC and AC – advantages of AC over DC – electromagnetic induction - transformers – inductors/chokes – capacitors/condensers – impedance – AC ammeter, voltmeter –symbols and nomenclature
UNIT-II	**TRANSMISSION OF ELECTRICITY:** production and transmission of electricity – concept of power grid – Series and parallel connections – technicalities of junctions and loops in circuits –transmission losses (qualitative) – roles of step-up and step-down transformers – quality of connecting wires – characteristics of single and multicore wires
UNIT-III	**ELECTRICAL WIRING:** different types of switches – installation of two way switch – role of sockets, plugs, sockets - installation of meters – basic switch board – electrical bell – indicator – fixing of tube lights and fans – heavy equipment like AC, fridge, washing machine, oven, geyser, jet pumps – provisions for inverter – gauge specifications of wires for various needs
UNIT-IV	**POWER RATING AND POWER DELIVERED:** conversion of electrical energy in to different forms – work done by electrical energy – power rating of electrical appliances – energy consumption – electrical energy unit in kWh – calculation of EB bill – Joule's heating – useful energy and energy loss – single and three phase connections – Measures to save electrical energy – energy audit
UNIT-V	**SAFETY MEASURES:** insulation for wires – colour specification for mains, return and earth – Understanding of fuse and circuit breakers – types of fuse: kit-kat, HRC, cartridge, MCB, ELCB – purpose of earth line – lighting arrestors – short circuiting and over loading – electrical safety – tips to avoid electrical shock – first aid for electrical shock – fire safety for electric current
TEXT BOOKS	1. Wiring a House: 5th Edition by Rex Cauldwell, (2014). 2. Black and Decker Advanced Home Wiring, 5th Edition: Backup Power - Panel Upgrades - AFCI Protection - "Smart" Thermostats, by Editors of Cool Springs Press, (2018). 3. Complete Beginners Guide to Rough in Electrical Wiring: by Kevin Ryan (2022).

COURSE	**SIXTH SEMESTER – SEC 7** **(Re appearance students only)**
COURSE TITLE	**PHYSICS OF MUSIC -23U6PHSEC7**
CREDITS	2
COURSE OBJECTIVES	To apprise and train students on the role of Physics in music and get the knowledge on the musical notes and instruments
UNITS	**COURSE DETAILS**
UNIT-I	**SCIENTIFIC STUDY OF MUSIC:** vibrations of atoms of matter– vibrations coupling to air – propagation of sound waves in air, other media, fluids and solids – velocity, frequency, wavelength, time period, intensity: definition and unit fs – classification of sound on frequency and velocity– human and animal sound perception– mechanism of ear and hearing – psychoacoustics
UNIT-II	**SIMPLE VIBRATING SYSTEMS:** simple harmonic motion – tuning fork– amplitude, phase, energy, energy loss/damping/ dissipation – power – travelling waves and standing waves– laws of vibration in stretched strings– one-dimensional medium – open and closed organ pipes – over tones, harmonics – quality of sound: pitch, timber, loudness – octaves, musical notes
UNIT-III	**MUSICAL TONE:** pure/simple tones – sine/cosine waves– well-defined frequencies, wavelengths, amplitudes and phases– partial tones – assembly of pure tones– mix of different frequencies and amplitudes– complex tone – superposition of simple tones – complex waveform– periodic complex waveform – formants – resonances– sound envelope
UNIT-IV	**PRODUCTION OF MUSICAL SOUNDS:** human voice, mechanism of vocal sound production – larynx (sound box) – *stringed Instruments*: plucked and bowed, guitar, mandolin, violin, piano, etc. – *wind instruments*: whistles, flute, saxophone, pipe organ, bagpipes, etc– *percussion instruments*: plates, membranes, drums, cymbals, xylophone etc. – *electronic instruments*: keyboards, electric guitars, rhythm pads, etc. – analog and digital sound synthesizers,–MIDI instrument– computer generated music
UNIT-V	**RECORDING OF MUSIC and SOUND:** Edison phonograph – cylinder and disk records – magnetic wire and tape recorders – digital recording (e.g. to CD, DVD, etc.)– analog transducers, condenser, dynamic microphones, loudspeaker – complex sound fields – near and far fields of acoustic– spectral analysis techniques – continuous and discrete Fourier transforms, digital signal processing – digital filtering – specifications of recording studios
TEXT BOOKS	1. Physics and Music: The Science of Musical Sound by Harvey White (2014) 2. Good Vibrations – The Physics of Music by Barry Parker, (2009) 3. The History of Musical Instruments by Curt Sachs, (2006) 4. Physics and Music: Essential Connections and Illuminating Excursions byKinko Tsuji and Stefan C. Müller(2021)