

J.J. COLLEGE OF ARTS AND SCIENCE, PUDUKKOTTAI – 622 422.
B.Sc. Physics Course Structure under CBCS
(For the candidates admitted from the academic year 2019-2020 onwards)

UG PROGRAMME - B.SC PHYSICS

OBJECTIVES:

- ❖ To enable students to understand basic concepts in physics
- ❖ To introduce to the learner methods of analysis, correlation and interpretation appropriate to the study of physics
- ❖ To develop the capacity to handle elementary lot apparatus, make observations and read results
- ❖ To enable the learner to apply mathematical formula to generate results
- ❖ To equip the learner with the ability to read and understand scientific entitles in journals

J.J. COLLEGE OF ARTS AND SCIENCE, PUDUKKOTTAI – 622 422.

B.Sc. Physics Course Structure under CBCS

(For the candidates admitted from the academic year 2019-2020 onwards)

Semester	Part	Course Code	Course	Title	Instr. Hour s/We ek	Credit	Exa m Hou rs	Marks		Total
								Int.	Extn.	
I	I	U1R1TL1/HL 1/FL1	Language Course –I(LC) – Tamil*/Other Languages** #		6	3	3	25	75	100
	II	U1R1EL1	English Language Course–I (ELC)		6	3	3	25	75	100
	III	U1R1PHCC1	Core Course –I(CC)	Properties of Matter and Sound	6	5	3	25	75	100
			Core Course–II(CC)	Major Practical–I	3	-	***	-	-	-
		U1R1MTAC1	First Allied Course–I(AC)	Mathematics – I Calculus and Fourier series	5	3	3	25	75	100
			First Allied Course–II(AC)	Algebra, analytical geometry of 3D and trigonometry	4	-	***	-	-	-
	Total				30	14				400
II	I	U2R1TL2/HL 2/FL2	Language Course –II(LC)- Tamil*/Other Languages** #		6	3	3	25	75	100
	II	U2R1EL2	English Language Course – II(ELC)		6	3	3	25	75	100
	III	U2R1PHCC2 P	Core Course–II(CC)	Major Practical–I	3	5	3	40	60	100
		U2R1PHCC3	Core Course–III(CC)	Mechanics	5	5	3	25	75	100
		U2R1MTAC2	First Allied Course–II (AC)	Algebra, analytical geometry of 3D and trigonometry	3	3	3	25	75	100
		U2R1MTAC3	First Allied Course–III(AC)	Mathematics III ODE, PDE, Laplace transforms and vector calculus	5	3	3	25	75	100
	IV	U2R1ES	Environmental Studies		2	2	3	25	75	100
Total					30	24				700

J.J. COLLEGE OF ARTS AND SCIENCE, PUDUKKOTTAI – 622 422.

B.Sc. Physics Course Structure under CBCS

(For the candidates admitted from the academic year 2019-2020 onwards)

Semester	Part	Code	Course	Title	Instr. Hours/Week	Credit	Exam Hours	Marks		Total
								Int.	Extn.	
III	I	U3R1TL3/HL3/F L3	Language Course –III(LC)– Tamil*/Other Languages** #		5	3	3	25	75	100
	II	U3R1EL3	English Language Course-III(ELC)		5	3	3	25	75	100
	III	U3R1PHCC4	Core Course–IV(CC)	Thermal and statistical physics	5	5	3	25	75	100
		U3R1PHCC5	Core Course– VI(CC)	Electricity and Magnetism	5	5	3	25	75	100
			Core Course– V (CC)	Major Practical-II	3	-	***	-	-	-
		U3R1CHAC4	Second Allied Course–I	.Allied Chemistry - I	5	3	3	25	75	100
	IV	U2R1VE	Value Education		2	2	3	25	75	100
Total					30	21				600
IV	I	U4R1TL4/HL4/F L4	Language Course –IV (LC) - Tamil*/Other Languages** #		5	3	3	25	75	100
	II	U4R1EL4	English Language Course–IV(ELC)		5	3	3	25	75	100
	III	U4R1PHCC6P	Core Course– V (CC)	Major Practical-II	3	5	3	40	60	100
		U4R1PHCC7	Core Course– VI(CC)	Basic Electronics	6	5	3	25	75	100
		U4R1CHAC5P	Second Allied Course–II	Allied Chemistry practical -II	3	3	3	40	60	100
		U4R1CHAC6	Second Allied Course–III	Allied Chemistry - III	5	3	3	25	75	100
	IV	U4R1PHSBE1	Skill Based Elective - I	To be selected from the list	3	2	3	25	75	100
Total					30	24				700

J.J. COLLEGE OF ARTS AND SCIENCE, PUDUKKOTTAI – 622 422.

B.Sc. Physics Course Structure under CBCS

(For the candidates admitted from the academic year 2019-2020 onwards)

Semester	Part	Code	Course	Title	Instr. Hours/Week	Credit	Exam Hours	Marks		Total
								Int.	Extn.	
V	III	U5R1PHCC8	Core Course– VII(CC)	Optics	5	5	3	25	75	100
		U5R1PHCC9	Core Course– VIII(CC)	Atomic & Nuclear Physics	5	5	3	25	75	100
		U5R1PHCC10	Core Course–IX(CC)	Digital Electronics	5	5	3	25	75	100
		U6R1PHCC11P	Core Course– X (CC)	Major Practical- III (General)	6	5	3	40	60	100
		U5R1PHMBE1	Major based Elective–I	To be selected from the list	4	4	3	25	75	100
	IV	U5R1PHSBE2	Skill based Elective –II	To be selected from the list	3	2	3	25	75	100
		U5R1PHIDC1	Inter Disciplinary Course – I	To be selected from the list	2	2	3	25	75	100
	Total				30	28				700
VI		U6R1PHCC12P	Core Course– XI(CC)	Major Practical- IV (Electronics)	6	5	3	40	60	100
		U6R1PHCC13	Core Course– XII(CC)	Elements of Theoretical Physics	5	5	3	25	75	100
		U6R1PHCC14	Core Course– XIII (CC)	Microprocessor and it’s applications	5	5	3	25	75	100
		U6R1PHMBE2	Major based Elective – II	To be selected from the list	4	4	3	25	75	100
		U6R1PHMBE3	Major based Elective - III	To be selected from the list	4	4	3	25	75	100
	IV	U6R1PHSBE3	Skill based Elective –III	To be selected from the list	3	2	3	25	75	100
		U6R1PHIDC2	Inter Disciplinary Course - I	To be selected from the list	2	2	3	25	75	100
		U6R1GS	Gender Studies		1	1	3	25	75	100
	V		Extension activities		-	1	-	-	-	-
	Total				30	29		30		800
Grand Total					140				3900	

Major Based Elective Courses (Any three out of five)

1. Solid State Physics
2. Computer Programming - C Language
3. Nano Science
4. Energy Physics
5. Communication Systems

Skill Based Elective Courses (Any three out of five)

1. Laser Physics and Spectroscopy
2. Biomedical Instrumentation
3. Electrical Home Appliances
4. Astrophysics
5. Photography

➤ Inter Disciplinary Courses

Offered by the Department

1. Basic of Digital Electronics
2. Basics of Electronics
3. Physics for Home Appliances

OUTCOME:

On completion of the course, the students will be able to

- ❖ Understood the basic concepts of physics and their practical relevance to daily life.
- ❖ Acquired skills of observation , correlation and logical reasoning.
- ❖ Gained the capacity to use scientific instruments and plan and perform laboratory experiments.
- ❖ Developed skills in the applications of mathematical formulas to generate and test results on specific data.
- ❖ Developed the scientific temper.

SEMESTER-I: CORE COURSE-I PROPERTIES OF MATTER AND SOUND		
Course Code : U1R1PHCC1		Max. Marks : 100
Hours/Week : 6		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- ❖ To study the basics of elasticity and its importance.
- ❖ To gain the knowledge of bending of beams
- ❖ To study the concepts of surface tension
- ❖ To acquire the knowledge of viscosity.
- ❖ To study and understand the concepts of sound.

UNIT-I: ELASTICITY**14 Hrs**

Stress – strain diagram – Hooke’s law – different moduli of elasticity (E, G, K) – relation between the elastic moduli – Poisson’s ratio –determination of Poisson’s ratio for rubber – torsion of a body–expression for torque per unit twist – determination of rigidity modulus by static torsion method (Searle’s apparatus) – work done in twisting a wire – torsional oscillations of a body – rigidity modulus by torsion pendulum (wire).

UNIT-II: BENDING OF BEAMS**14 Hrs**

Introduction – expression of bending moment – expression for the depression of the loaded end of a cantilever – young’s modulus by cantilever depression – oscillations of a cantilever – non-uniform bending – expression for depression – uniform bending – expression for elevation – experiment to determine young’s modulus using pin and microscope (uniform and non uniform bending) –experiment to determine young’s modulus by Koenig’s method.

UNIT-III: SURFACE TENSION**14 Hrs**

Definition and dimension of surface tension –molecular forces – explanation of surface tension on kinetic theory – excess pressure inside a liquid drop and a soap bubble – excess pressure inside a curved liquid surface – experimental determination of surface tension by Jaeger’s method, drop weight method – interfacial surface tension – experiment to determine interfacial surface tension between water and kerosene.

UNIT-IV: VISCOSITY**14 Hrs**

Definition and dimension of viscosity– streamline and turbulent flow– Reynold’s number –Poiseuille’s formula for flow of liquid through a capillary tube – Poiseuille’s method for determining coefficient of viscosity of a liquid (variable pressure head) – Ostwald’s viscometer– Stokes method for coefficient of viscosity of a liquid – viscosity of gas – modification of Poiseuille’s formula for gases.

UNIT-V: ACOUSTICS AND ULTRASONICS**13 Hrs**

Acoustics of buildings – factors affecting acoustics of buildings – reverberation time – Sabine's formula – requirements for good acoustics.

Ultrasonics – introduction – production - piezo electric oscillator method– detection – properties - application of ultrasonic waves (science, industry, and medical)

UNIT-VI: LATEST LEARNING**3Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FORSTUDY:

1. Properties of matter, R. Murugesan, S.Chand& Co. Pvt Ltd, Revised edition, 2012.
2. Properties of matter, Brijlal and Subramaniam, Vikas Publishing Pvt Ltd, 2005.
3. A Textbook of Sound, Brijlal and Subramaniam, Vikas Publishing Pvt Ltd, 2008.

BOOKS FORREFERENCE:

1. Elements of Properties of matter – D.S.Mathur, S.Chand& Co. Pvt Ltd, Revised edition, 2010.

COURSE OUTCOME:

On completion of this course, the students will be able to

- ❖ Basic concepts in elastic properties of materials.
- ❖ Importance of elasticity in beams and girders.
- ❖ Significance of surface tension in real life.
- ❖ Viscous properties of fluids used in industrial product development (dyes, paints, food products).
- ❖ Applications of ultrasonic waves in diverse fields.

SEMESTER-II: CORE COURSE-II: MAJOR PRACTIAL-I (ANY FIFTEEN)		
Course Code : U2R1PHCC2P		Max. Marks : 100
Hours/Week : 3		Internal Marks : 40
Credit : 5		External Marks : 60

OBJECTIVES:

To motivate and educate the students to acquire skill in physics Experiments.

1. Non-Uniform Bending – Pin And Microscope.
2. Uniform Bending– Optic lever.
3. Surface Tension– Capillary rise.
4. Surface Tension And Interfacial Tension – Drop Weight Method
5. Sonometer – Verification Of laws and Determination of frequency
6. Meld’s Experiment– Transverse And Longitudinal.
7. Compound Pendulum–Gand K.
8. Cantilever Depression–Scale And Telescope.
9. Specific heat capacity of A liquid– Newton’s Law Of Cooling.
10. Thermal Conductivity of Abad Conductor–Lee’s disc.
11. Long focus Convex lens– F, R, μ .
12. Long Focus Concave lens – F, R, μ .
13. Newton’s Rings –‘R’determination, μ of Liquid.
14. Spectrometer– μ of Solid Prism.
15. Air wedge– Thickness Of Insulation.
16. P.O. Box– Temperature Coefficient.
17. Meter Bridge – Specific Resistance
18. Semiconductor Diode–Characteristics

REFERENCE BOOKS:

1. A text book of practical Physics–M.N.Srinivasanandothers–Sultan Chand&Sons, NewDelhi.
2. Practical Physics, S. Somasundaram, V. Balachandran, S. Padmanathan, Apsara Publications, Tiruchirapalli.

3. Practical Physics – A.DhanaLakshmi and K.R. Paramasivam – Apsara Publication, Trichy.

COURSE OUT COME:

On completion of this course, the students will be able to

- ❖ understand the concepts of mechanics, properties of matter and sound through different experiments.
- ❖ Acquire the basic trouble shooting skills and appreciate physics concepts through experiments.

SEMESTER-I: ALLIED MATHEMATICS – I		
Course Code : U1R1MTAC1		Max. Marks : 100
Hours/Week : 6		Internal Marks : 25
Credit : 3		External Marks : 75

OBJECTIVES:

- ❖ To find the derivative of the function using the limit definition
- ❖ To Evaluate of integrals of some standard types.
- ❖ To discuss about definite integrals and its properties.
- ❖ To represent a periodic signal with continuous time Fourier series
- ❖ To Evaluate of Double and Triple integrals

UNIT - I: SUCCESSIVE DIFFERENTIATION**13 Hrs**

Successive Differentiation - n^{th} derivative of standard functions (Derivation not needed) simple problems only-Leibnitz Theorem (proof not needed) and its applications – Curvature – circle and radius of curvature in Cartesian only (proof not needed).

UNIT II: EVALUATION OF INTEGRALS**14 Hrs**

Evaluation of integrals of types $\int \frac{px+q}{ax^2+bx+c} dx, \int \frac{px+q}{\sqrt{ax^2+bx+c}} dx, \int \frac{dx}{a+b\cos x}, \int \frac{dx}{a+b\sin x}$

Integration by trigonometric substitution and by parts of the integrals (Problems only)

$$\int \sqrt{a^2 - x^2} dx, \int \sqrt{a^2 + x^2} dx, \int \sqrt{x^2 - a^2} dx$$

UNIT -III: DEFINITE INTEGRAL**15 Hrs**

General properties of definite integrals - Evaluation of definite integrals of types

$$\int_a^b \frac{dx}{\sqrt{(x-a)(b-x)}}, \int_a^b \sqrt{(x-a)(b-x)} dx, \int_a^b \sqrt{\frac{x-a}{b-x}} dx$$

Reduction formula (when n is a positive integer) for

$$\int_a^b e^{ax} x^n dx, \int_a^b \sin^n x dx, \int_a^b \cos^n x dx, \int_0^x e^{ax} x^n dx, \int_0^{\pi/2} \sin^n x dx, \int_0^{\pi/2} \cos^n x dx, \int_0^{\pi/2} \sin^n x \cos^m x dx$$

UNIT - IV: MULTIPLE INTEGRALS**14 Hrs**

Evaluation of Double and Triple integrals in simple cases - Changing the order and evaluating of the double integration. (Cartesian only)

UNIT- V: FOURIER SERIES**14 Hrs**

Definition of Fourier Series - Finding Fourier Coefficients for a given periodic function with period 2π - Use of Odd & even functions in evaluating Fourier Coefficients - Half range sine & cosine series.

UNIT-VI: LATEST LEARNING**02 Hrs**

Latest development related to the course during the semester concerned. [For continuous CIA Assessment only]

TEXT BOOKS:

[1] “Calculus, Vol. I”, S.Narayanan, T.K.ManichavasagamPillai, S.ViswanathanPvt. Limited, 2003.

[2] “Calculus, Vol. II”, S.Narayanan, T.K.ManichavasagamPillai, S.ViswanathanPvt. Limited, 2003.

[3] “Allied Mathematics” - S.G.Vengatachalapathy, Marghum Publications

Unit I : Chapter 3 – Fully and Chapter 10 - 2.1, 2.3 [1]

Unit II : Chapter 1 - Sec. 7.3 (ii), Sec. 8 (ii), 1, 2, 3 (v), Sec. 9, fully [2]

Unit III : Chapter 1 - Sec. 11 - fully, sec. 13, 13.1, 13.3, 13.4, 13.5 [2]

Unit IV : Chapter 5 - Sec. 2.1, 2.2 & Sec. 4 [2]

Unit V: Chapter 12 - 12.1 to 12.40 [3]

REFERENCE BOOK:

1) “Engineering Mathematics” - Babu Ram - Pearson Publication

COURSE OUTCOMES:

The Learners would have the ability to

- ❖ Solve problems on successive differentiation and Leibnitz theorem.
- ❖ Understand and apply the definite integral formula.
- ❖ Understand the general properties of definite integrals
- ❖ Develop Fourier series for different types of functions.

SEMESTER- II: ALLIED MATHEMATICS – II		
Course Code : U2R1MTAC2		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 3		External Marks : 75

➤ Apply the basic rules of Multiple Integrals.

OBJECTIVES:

- ❖ To derive Binomial, Exponential and logarithmic series.
- ❖ To carry out the basic operation of matrix algebra
- ❖ to Find the shortest distance between two skew lines
- ❖ To synthesize all the mathematical presentation of Expansion
- ❖ To analyze situations, check for limitations, examine appropriate methods of solution using trigonometry.

UNIT - I: BINOMIAL, EXPONENTIAL AND LOGARITHMIC SERIES 12 Hrs

Important expansions - summation & approximation related problems only - limits and approximations.

UNIT - II: MATRIX 10 Hrs

Non-singular, Symmetric, Skew Symmetric, Orthogonal, Hermitian, Skew Hermitian and Unitary matrices - Characteristics equation, eigen values, eigen vectors - Cayley Hamilton's theorem (proof not needed) - Simple applications only.

UNIT III - ANALYTICAL GEOMETRY (3D) 14 Hrs

Finding the shortest distance between two skew lines and the equation of the plane containing them - Condition of Coplanarity - Equation of a Sphere - Tangent plane - Plane section of a sphere - Finding the center & radius of the circle of intersection - Sphere through the circle of intersection (only problems in all the above)

UNIT – IV: EXPANSION 12 Hrs

Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ (n being a positive integer) - Expansion of $\sin^n\theta$, $\cos^n\theta$, $\sin^n\theta\cos^m\theta$ in a series of sines & cosines of multiples of θ (θ - given in radians) - Expansion of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of powers of θ (only problems in all the above).

UNIT - V: HYPERBOLIC FUNCTIONS 10 Hrs

Euler's formula for $e^{i\theta}$ - Definition of Hyperbolic functions - formulae involving Hyperbolic functions - Relation between Hyperbolic & circular functions - Expansion of $\sinh x$, $\cosh x$, $\tanh x$ in power of x - Expansion of Inverse hyperbolic function $\sinh^{-1}x$, $\cosh^{-1}x$ and $\tanh^{-1}x$ - Separation of real & imaginary parts of $\sin(x+iy)$, $\cos(x+iy)$, $\tan(x+iy)$, $\sinh(x+iy)$, $\cosh(x+iy)$, $\tanh(x+iy)$.

UNIT-VI: LATEST LEARNING**02 Hrs**

Latest development related to the course during the semester concerned. [For continuous CIA Assessment only]

TEXT BOOKS:

[1] T.K.ManicavachagamPillai, T.Natarajan, K.S.Gnanapathy, “Algebra, Vol. I, algebra, Vol. II”, S.Viswanathan Pvt. Limited, Chennai, 2004.

[2] S.NarayananT.K.ManichavasagamPillai, “Trigonometry” S.ViswanathanPvt.Limited, and Vijay Nicole Imprints Ptv Ltd, 2004.

[3] T.K.ManickavasagamPillai, Analytical Geometry (3D) and Vector Calculus, New Gamma Publishing House.

Unit I: Chapter III, IV - Simple problems only in [1] Vol. [1]

Unit II: Chapter II - fully in [1] vol. [2]

Unit III: Chapter I - Sec. 1, 2, Chapter IV, Sec. 35 to 41 [3]

Unit IV: Chapter III, fully [2]

Unit V: Chapter IV, fully [2]

REFERENCE BOOKS:

- 1) “Analytical Geometry”, Duraipandian & Chaterjee
- 2) “Trigonometry”- Arumugam & others - New Gamma publications.

COURSE OUTCOMES:

The Learners would have the ability to

- ❖ Find the approximate solution of roots of polynomials by suitable methods and problems based on exponential and logarithmic series.
- ❖ Know the applications of Cayley Hamilton's Theorem.
- ❖ Find the equation of the system of planes and the length of perpendicular to a plane and angle between the lines.
- ❖ Expand $\cos^m \theta$, $\sin^n \theta$, $\cos^m \theta \sin^n \theta$, for different values of n & m .
- ❖ Solve problems involving hyperbolic functions.

SEMESTER-II: CORE COURSE-III: MECHANICS		
Course Code : U2R1PHCC3		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- ❖ To study the effect of impact of two bodies.
- ❖ To have a knowledge in the field of dynamics
- ❖ To study the motion of freely suspended bodies.
- ❖ To understand the concepts of centre of gravity and centre of pressure.
- ❖ To understand the concepts of hydrodynamics.

UNIT- I PROJECTILE, IMPULSE AND IMPACT**12 Hrs**

Projectile – motion of a particle projected horizontally from a point above the earth – particle projected in any direction – path of a projectile is a parabola – range of a projectile on a plane inclined to the horizontal – impulse of a force - impact - laws of impact –oblique impact of a smooth sphere on a fixed smooth plane – direct and oblique impact of two smooth spheres – loss in kinetic energy due to direct and oblique impact.

UNIT-II: DYNAMICS OF RIGID BODIES**11 Hrs**

Moment of inertia – parallel and perpendicular axes theorem – moment of inertia of a thin circular ring - moment of inertia of a circular disc - M.I of a cylinder about an axis perpendicular to its length – M.I of a hollow cylinder about an axis passing through the centre and perpendicular to the length – M.I of a hollow cylinder about its own axis -M.I of a solid sphere – M.I of a hollow sphere - Kinetic energy of a rotating body – angular momentum of a rotating body.

UNIT –III: SIMPLE HARMONIC MOTION**11 Hrs**

Definition – Theory of free vibrations – damped vibrations – forced vibrations – sharpness of resonance – power dissipation and quality factor – compound pendulum – determination of ‘g’ and radius of gyration of a compound pendulum – Kater’s pendulum-determinations of ‘g’.

UNIT-IV: GRAVITATION AND CENTRE OF GRAVITY**12 Hrs**

Universal law of gravitation –Kepler’s laws of planetary motion – Boy’s method of determination of G - gravitational potential and field due to solid sphere – variation of g with altitude -centre of gravity of an arc of a circle and sector of a circle – centre of gravity of solid and hollow hemisphere – centre of gravity of a solid tetrahedron.

UNIT-V: HYDROSTATICS AND HYDRODYNAMICS**11 Hrs**

Pressure and thrust – centre of pressure – determination of centre of pressure (general case) - centre of pressure of a vertical rectangular lamina immersed vertically in a liquid – centre of pressure of a vertical triangular lamina.

Equation of continuity - Euler's equation for unidirectional flow – Bernoulli's theorem – Applications of Bernoulli's theorem - Torricelli's theorem –venturimeter- Pitot tube.

UNIT-VI: LATEST LEARNING**3Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FORSTUDY:

1. Properties of matter, R. Murugesan, S.Chand& Co. Pvt. Ltd., Revised edition, 2012.
2. Mechanics, D.S. Mathur, S. Chand& Co. Pvt. Ltd. Limited, 2000

BOOKS FORREFERENCE:

- 1 Dynamics, M..Narayanamoorthy and N. Nagaratnam, The National Publishing Company, Chennai, 2002

COURSE OUTCOME:

On completion of this course,the students will be able to

- ❖ Explain the basics in projectile and where it is applied
- ❖ Concepts of rigid body dynamics in terms of moment of inertia.
- ❖ SHM and to calculate the value of 'g' using freely suspended bodies.
- ❖ Gravitation and centre of gravity at various locations.
- ❖ The concepts of hydrostatics and hydrodynamics in day to day applications such as pumps and hydraulic press.

SEMESTER-II: ALLIED MATHEMATICS - III		
Course Code : U2R1MTAC3		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 3		External Marks : 75

OBJECTIVES:

- ❖ To learn the techniques of calculus and its applications
- ❖ To provide the standard methods for solving differential equations as well as methods based on the use of Laplace transforms
- ❖ To understand the idea of Inverse Laplace Transforms
- ❖ To give a systematic study of Vector Calculus..
- ❖ To understand the basic concepts of vector differentiation and integration.

UNIT –I: LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS 12 Hrs

Definition – The operator D – Complementary function of a Linear equation with constant coefficients - Finding Particular integrals in the cases of e^{kx} , $\sin(kx)$, $\cos(kx)$ (where k is a constant), x^k where k is a positive integer(only problems) in all the above - No proof needed for any formula.

UNIT – II: LAPLACE TRANSFORMS 10 Hrs

Definition - $L(e^{at})$, $L(\cos(at))$, $L(\sin(at))$, $L(t^n)$, where n is a positive integer - Laplace Transforms of periodic functions some general theorems.

UNIT –II: INVERSE LAPLACE TRANSFORMS 10 Hrs

The Inverse Laplace Transforms - Solving second order ODE with constant coefficients using Laplace Transforms.

UNIT –IV: VECTOR DIFFERENTIATION 14 Hrs

Vector function – limits and continuity of a Vector function– Derivative of a Vector function with respect to a scalar – Integration of Vector functions – Partial derivatives of vectors – The Vector Differential operator ∇ - Gradient of a Scalar field – Directional derivative of a scalar point function -Tangent plane and normal to a level surface – Divergence of a Vector function - Curl of a Vector point function.[No proof is needed for theorems, only statement and related problems.

UNIT –V: VECTOR INTEGRATION 12 Hrs

Line integrals - surface integrals - volume integrals – The divergence theorem of Gauss, Green's theorem - Stoke's Theorem (No proof needed, Problems only).

UNIT-VI: LATEST LEARNING 02 Hrs

Latest development related to the course during the semester concerned. [For continuous CIA Assessment only]

TEXT BOOKS:

[1] “**Differential Equations and its Applications**” S.Narayanan, T.K. ManikavachagamPillay Publishers, 2011.

[2] “**Vector Calculus**” by J. N. Sharma and A.R. Vasishtha published by Krishna Prakashanmedia (P) Ltd

Unit I: Chapter 5, Sec 1 – 4 [1]

Unit II: Chapter 9, Sec. 1 - 5 [1]

Unit III: Chapter 9, Sec. 6 – 9 [1]

Unit IV: Chapter 1-1, 2, 3, 6 Chapter 2- 1,2,3,5,6,7,8 [2]

Unit V: Chapter 3 (2, 4, 5, 7, 8, 9) [2]

REFERENCE BOOKS:

1. “Ordinary and partial differential equation”, M.D. Raisinghanian - S. Chand & Co.
2. “Mathematical physics” -B.D.Gupta - Vikas Publications.

COURSE OUTCOMES:

The Learners would have the ability to

- ❖ Understand the concepts of linear equations.
- ❖ Evaluate Laplace Transforms of periodic functions.
- ❖ Apply the Inverse Laplace Transform to solve second order ODE with constant coefficients.
- ❖ Acquire the knowledge of Vector Differentiation and Integration.
- ❖ Use the vector identities, directional derivatives and divergence of a vector point function are evaluated easily.

SEMESTER-III: CORE COURSE-IV: THERMAL AND STATISTICAL PHYSICS		
Course Code : U3R1PHCC4		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- ❖ To study about the nature of heat
- ❖ To learn the concepts of thermodynamics
- ❖ To study the basic concepts of statistical Physics
- ❖ To learn experimental methods to determine the transmission of heat
- ❖ To Know and analysis Maxwell's thermo dynamical relations and their importance

UNIT-I: THERMODYNAMICS**12 Hrs**

Zeroth law of thermodynamics – First law of thermodynamics – Heat engines – Reversible and irreversible processes of Carnot's theorem – Second law of thermodynamics, Thermodynamic scale of temperature – Entropy – Change of entropy in reversible and irreversible processes – Temperature – entropy diagram(T.S) – Law of increase of entropy – Maxwell thermodynamical relations – clausius's – claypeyron's latent heat equations.

UNIT-II: LOW TEMPERATURE**12 Hrs**

Joule – Thomson's effect – Porous plug experiment – Liquefaction of gases – Linde's method – Adiabatic demagnetization – Liquefaction of He – Partial applications of low temperature – Refrigerating mechanism – Air conditioning machines.

UNIT-III: RADIATION**11 Hrs**

Radiation – stefan's law Deduction of Newton's law from Stefan's law – Boltzmann's law – Black body radiation – Wein's law – Rayleigh – Jean's law – Planck's law – Angstrom Pyroheliometer – Solar constant – Surface temperature of sun Sources of solar energy – Some everyday applications.

UNIT-IV: SPECIFIC HEATS**12 Hrs**

Specific heat of solids – Einstein's theory of specific heat – Debye's theory – specific heat of gases – Mayer's Relation – Quantization of various contributions to energy of diatomic molecules – Specific heat of diatomic gases –(Quantum theory)

UNIT-V: STATISTICAL PHYSICS**10 Hrs**

Phase space – Statistical Equilibrium – Microstates and Microstates – Maxwell – Boltzmann statistics – Application of M-B statistics to molecular energies in an ideal gas – B-E statistics – Application of B-E statistics to photon gases – F-D statistics – Application of F-D statistics to electron gas – Comparison of three statistics.

UNIT-VI: LATEST LEARNING**3Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. Brijilal, and subramaniyam, Heat and Thermodynamics, S. Chand & Co. (2016).
2. J.B. Rajam and C.L. Arora, Heat and Thermodynamics.

BOOKS FOR REFERENCE:

1. Gupta S.L. & Kumar V., Statistical Mechanics, Pragati Prakashan, Meerut, 2006

COURSE OUTCOME:

On completion of this course, the students will be able to

- ❖ Apply both the first and second laws to determine heat transfer, work, and property changes during processes occurring in both closed and open system.
- ❖ Have a clear understanding about Reversible and irreversible process and also working of a Carnot's engine, and knowledge of calculating changes in entropy for various processes.
- ❖ Understand the central concepts and basic formalism of specific heat, entropy, quantum theory of radiation.
- ❖ Realize the importance of thermodynamical functions and applications of Maxwell's relations.
- ❖ Familiarize in depth about statistical distribution and have basic ideas about Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics and their applications.

SEMESTER-III: CORE COURSE-V: ELECTRICITY AND MAGNETISM		
Course Code : U3R1PHCC5		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- ❖ To study the static characteristics of electric charges
- ❖ To understand the concepts of electromagnetic effect.
- ❖ To study basic concepts of AC circuits.
- ❖ To understand the concepts magnetic properties of materials
- ❖ To understand of the relation between electric field and potential

UNIT-I: ELECTROSTATICS**12Hrs**

Coulomb's law – Gauss theorem and its applications (Intensity at a point due to a charged sphere & cylinder) – Principle of a capacitor – Capacity of spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charges.

Unit-II: CURRENT ELECTRICITY**10Hrs**

Kirchoff's Law— Wheatstone network – Carey Foster's Bridge – Potentiometer - Measurement of current, resistance and low voltage – Theory of Moving coil Galvanometer – Figure of merit – Damping Correction.

Unit-III: ELECTROMAGNETIC INDUCTION**12Hrs**

Laws of electromagnetic induction – Self and mutual induction – Self inductance of a solenoid – Mutual inductance of a pair of solenoids – Coefficient of coupling – Experimental determination of self and mutual inductance (Rayleigh's method) Growth decay of current in circuit containing L and R – High resistance by leakage – Charging and discharging of capacitor through L and R.

Unit IV: AC CIRCUITS**11Hrs**

Alternating EMF – Alternating EMF applied to circuits containing L and R – C and R – Alternating EMF applied to circuits containing L, C and R – Series and Parallel resonance circuits – Sharpness of resonance – Q factor – Power in AC circuits – Power factor – Wattless current

Unit-V: MAGNETISM**12Hrs**

Intensity of magnetization – Susceptibility – Types of magnetic materials – Properties para, dia and ferro magnetic materials – Cycle of magnetization – Hysteresis – B-H curve – application of B-H curve– Magnetic energy per unit volume.

UNIT-VI: LATEST LEARNING**3Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. Brijlal and Subramaniam – A Text books of Electricity and Magnetism , Ratan Prakasan Mandir Educational and university publishers, New Delhi,2000.
2. R. Murugesan, Electricity and Magnetism, S.Chand & Co,2015.

BOOKS FOR REFERENCE:

1. D.L sehgal,K.L.choproa and N.K sehal, Electricityand Magnetism– S.Chand&Co.-1996
2. A.P Gupta, Electricity and Magnetism, M/S Books and Allied (p) Ltd, Kolkata,2018.

COURSE OUTCOME:

On completion of this course,the students will be able to

- ❖ Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.
- ❖ Specify the constitutive relationships for fields.
- ❖ Apply Gauss's law of electrostatics to solve a variety of problems.
- ❖ Demonstrate a working understanding of capacitors.
- ❖ Have an ability to determine and describe static and dynamic electric

SEMESTER-VI: CORE COURSE-V: MAJOR PRACTICAL– II (ANYFIFTEEN)		
Course Code : U4R1PHCC6P		Max. Marks : 100
Hours/Week : 3		Internal Marks : 40
Credit : 5		External Marks : 60

OBJECTIVES:

To motivate and educate the students to acquire skill in physics Experiments.

1. Static Torsion – Determination of n
2. Torsional pendulum– n and I
3. Coefficient of viscosity of highly viscous liquid
4. Stoke's method – Viscosity of highly viscous liquid
5. Characteristics of Zener diodes
6. Emissive power of a surface – Spherical calorimeter
7. Joule's calorimeter – Specific heat capacity of liquid (Barton's correction)
8. Carey Foster's Bridge– R and p
9. Potentiometer– Ammeter calibration
10. Potentiometer– Temperature coefficient of R
11. Potentiometer – Calibration of flow range voltmeter
12. Figure of merit– Mirror Galvanometer
13. Transistor Characteristics– CE – configuration
14. Spectrometer– μ of a liquid
15. Spectrometer– I - d curve
16. CRO – Study of waveforms– Lissajous figures– f determination
17. Construction of Full wave rectifier
18. Construction of a temperature controller using Pt100 sensor

REFERENCE BOOKS:

1. A textbook of practical Physics– M.N. Srinivasan and others– Sultan Chand & Sons, New Delhi.
2. Practical Physics, S. Somasundaram, V. Balachandran, S. Padmanathan, Apsara Publications, Tiruchirapalli.

3. Practical Physics – A. DhanaLakshmi and K.R. Paramasivam – Apsara Publication, Tiruchirapalli.

COURSE OUT COME:

On completion of the course, the students will be able to

- ❖ understand the concepts of mechanics, properties of matter and sound through different experiments.
- ❖ Acquire the basic trouble shooting skills and appreciate physics concepts through experiments.

SEM-III:ALLIED COURSE-I: ALLIED CHEMISTRY-I		
Course Code : U3R1CHAC4		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 3		External Marks : 75

OBJECTIVES:

- ❖ To understand the concept of periodic properties and molecular orbital theory.
- ❖ To know the chemistry of biomolecules
- ❖ To learn polymers and its types
- ❖ To study the concept of stereochemistry electrochemistry and photochemistry.
- ❖ To learn the principles of separation techniques.

UNIT-I:PERIODIC PROPERTIES, MO THEORY AND INDUSTRIAL CHEMISTRY**12 Hrs**

1.1. Periodic properties- Ionization potential, electron affinity and electro negativity-Definition, factors affecting and variation in the periodic table.

1.2. Molecular Orbital Theory: LCAO, Bonding, anti-bonding orbital and bond order, MO diagrams of H₂, He₂, N₂, O₂ and F₂ molecules

1.3 Industrial Chemistry:Fuel gases –Water gas,Producer gas, LPG, Gobar gas and Natural gas.

1.4. Fertilizers – NPK and mixed fertilizers. Soap and detergents – An elementary idea of soap and detergent- cleansing action of soap and detergents.

UNIT – II: CARBOHYDRATES, PROTEINS AND NUCLEIC ACIDS**12 Hrs**

2.1. Carbohydrates: Classification. Glucose and fructose – Preparation and properties. Sucrose –Manufacture and properties. Starch and cellulose – Structure and uses.

2.2. Amino Acids and Proteins: Amino acids – Definition, classification, preparation and Properties - Peptides (Elementary treatment)–Proteins–Classification based on physical properties and biological functions.

2.3. Nucleic acids: DNA and RNA – functions - Structure of DNA and RNA.

UNIT – III: POLYMERS, HETEROCYCLIC COMPOUNDS AND STEREOISOMERISM**(11 Hrs)**

3.1. Polymers – Definition, classifications of polymers – Natural and synthetic polymers, Inorganic and organic polymers, Thermo and thermosetting plastics. Addition and condensation

polymerization. Preparation, properties and uses of polyethylene, PVC, Teflon, polyester, nylon 6, 6, and Bakelite.

3.2. Heterocyclic compounds – Furan, thiophene, and pyridine – Preparation, properties and uses.

3.3. Stereoisomerism: Optical isomerism – lactic and tartaric acid, Racemic mixture and resolution, Geometrical isomerism – maleic and fumaric acid, methods of determining geometrical isomerism

UNIT – IV: CHROMATOGRAPHY, PHOTOCHEMISTRY AND PHASE RULE (11 Hrs)

4.1. Chromatography– introduction-principle, sampling and applications of paper, thin layer and column chromatography.

4.2 Photochemistry: Differences between thermal and Photochemical reactions photochemical laws Grothus-Draper's law, Einstein's law of photo chemical Quantum efficiency, Lambert's law, Beer's law – derivation, equivalence.

4.3 Phase Rule: Phase, Component, Degree of freedom, Phase Rule – definition, one component system- water

UNIT – V: CONDUCTANCE, CORROSION, PH AND BUFFER

11 Hrs

5.1. Conductance: Ionic conductance, electrolytic conductance, specific an equivalent conductance – their determination, Effect of dilution on conductivities, An elementary idea about ionic theory, Ostwald's dilution law and Kohlrausch's law, conductometric titrations-Principle, applications (Strong acid vs Strong base and Weak acid and Weak base) and advantages.

5.2. Corrosion: Definition, types, wet and dry corrosion and preventive of corrosion.

5.3. pH and Buffer: pH, buffer solution- Henderson-Hasselbalch equation and its importance

(no derivation)-Biological importance of pH and Buffer solutions in living system.

Unit -VI: LATEST LEARNING'S (FOR CIA ONLY)

3 Hrs

Latest development related to the course during the semester concerned

COURSE OUTCOME:

At the end of the course, the learners will be able to

- ❖ Know the periodicity and MO theory.
- ❖ Understand the concepts of functions of biomolecules,
- ❖ Get the knowledge on stereochemistry and photochemistry
- ❖ Know the conductance of solutions and awareness about corrosion

TEXT BOOKS

1. P.L. Soni – “Text book of Inorganic Chemistry. S. Chand & Co., New Delhi (2000)

(UNIT I)

2. P.L. Soni and H.M. Chawla – “Text Book of Organic Chemistry” – 28th Edition, (1999) - Sulthan and Chand company, New Delhi (**UNIT II** and **UNIT III**)

3. B.R. Puri, L.R. Sharma and M.S. Pathania, “Principles of Physical Chemistry”, Vishal Publications, 47th Edition Jalandhar, 2017. (**UNIT IV** and **UNIT V**)

REFERENCES:

1. Bahl and Arun Bahl – “Advanced Organic Chemistry” – 12th Edition., (2014) – Sulthan and Chand company, New Delhi.
2. M.K. Jain – “Organic Chemistry” – 4th Ed., (2014) Sulthan and Chand Company, New Delhi
3. R.L. Madan, G.D. Tuli, “Simplified Course in Physical Chemistry”, 5th revised and enlarged edition, S.Chand & Co., New Delhi, 2009.

SEMESTER-IV: CORE COURSE-VII: BASIC ELECTRONICS		
Course Code : U4R1PHCC7		Max. Marks : 100
Hours/Week : 6		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- ❖ To learn about the characteristics of semiconductor devices under forward and reverse biasing
- ❖ To understand the basic concepts of transistor and Fet.
- ❖ To study about the functions and different types of amplifiers and oscillators.
- ❖ To know the basic working principle of special diodes.
- ❖ To understand the basic concepts of operational amplifier.

UNIT-I: SEMICONDUCTORS AND DIODES**14 Hrs**

Intrinsic and extrinsic semiconductor – PN junction diode – Biasing of PN junction – VI Characteristics of diode – Rectifiers – Half wave – full wave and bridge rectifiers – Break down mechanisms – Zener diode - characteristics – Zener diode as voltage regulator.

UNIT-II: TRANSISTORS (BJT AND FET)**14 Hrs**

BJT structure – working of a transistor – Three configuration of transistors (CB, CE and CC) – CE amplifier circuit – DC load line – JFET - Structure – Characteristic – Parameter – comparison between FET and BJT

UNIT-III: AMPLIFIERS AND OSCILLATORS**14 Hrs**

Transistor as a two port network – h Parameters - Single stage CE amplifier – Analysis of hybrid equivalent circuit – Power amplifiers – Efficiency of class B Power amplifier – Push-pull amplifier – General theory of feedback – Properties of negative feedback – Criterion for oscillations – Hartley oscillator – Colpitt's oscillator – Wien bridge's oscillator.

UNIT-IV: SPECIAL SEMICONDUCTOR DEVICES**14 Hrs**

Construction and characteristics - Photo transistor – LED – Photodiode – Varactor diode – SCR – DIAC – TRIAC – Tunnel diode – UJT – UJT as relaxation oscillator.

UNIT-V: OPERATIONAL AMPLIFIERS**13 Hrs**

Op – Amp characteristics - virtual ground – Inverting – Non Inverting Amplifiers – CMRR – Applications – Adder – Subtractor – Integrator – Differentiator – Comparator – D/A Conversion – Binary and Ladder Method - A/D Successive Approximation Method – Counter type.

UNIT-VI: LATEST LEARNING**3 Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FORSTUDY:

1. Mehta V.K., Principles of Electronics, S.Chand and company Ltd.2014.
2. Chattopadhyay,D., Raxshit, P.C.,Sara, B. and Purkait, New AgeInternational (P)Ltd.
3. Salivahanan,Electronic Device and circuit,Tata McGraw - Hill education, 1998.

BOOKS FORREFERENCE:

1. Theraja. B. L.,Basic electronics solid state, S. Chand andCompany Ltd (2002).
2. SedhaR.S., A text book of applied Electronics,S. Chand &company Ltd(2002).

COURSE OUTCOME:

On completion of this course, the students will able to

- ❖ Acquire basic knowledge of p-n junction diode, different rectification process, filtering techniques
- ❖ Understanding Thevenin's theorem and procedure for finding Thevenin's equivalent circuit and to gain knowledge of Maximum Power theorem
- ❖ Acquiring Knowledge on Fabrication of a transistor, different configuration, Biasing, h parameters and Finding different applications of FET
- ❖ Studying the amplitude and frequency response of common amplification circuits
- ❖ Understanding negative and positive feed backs

SEM-IV:ALLIED COURSE-II: ALLIED CHEMISTRY PRACTICAL		
Course Code : U4R1CHAC5P		Max. Marks : 100
Hours/Week : 3		Internal Marks :40
Credit : 3		External Marks : 60

OBJECTIVES:

- ❖ To know the basic principles of volumetric analysis and learn the techniques
- ❖ To understand the concepts of indicators and equivalent weight
- ❖ To know the estimation of total hardness of water
- ❖ To identify the functional group present in organic compounds by qualitatively

I. Volumetric Analysis

1. Estimation of HCl by NaOH using a standard oxalic acid solution
2. Estimation of Na_2CO_3 by HCl using a standard Na_2CO_3 solution
3. Estimation of oxalic acid by KMnO_4 using a standard oxalic acid solution
4. Estimation of Iron (II) sulphate by KMnO_4 using a standard Mohr's salt solution.
5. Estimation of Ca (II) by KMnO_4 using a standard oxalic acid solution.
6. Estimation of KMnO_4 by thio using a standard $\text{K}_2\text{Cr}_2\text{O}_7$ solution.
7. Estimation of Fe (III) by using $\text{K}_2\text{Cr}_2\text{O}_7$ using a standard Mohr's salt solution using internal and external indicators.
8. Estimation of copper (II) sulphate by $\text{K}_2\text{Cr}_2\text{O}_7$ solution
9. Estimation of Mg (II) by EDTA solution
10. Estimation of Ca (II) by EDTA solution

II .Organic Analysis:

- a). Identification of acidic, basic, phenolic and neutral organic substances
- b). Detection of N, S and halogens
- c).Test for aliphatic and aromatic nature of substances.
- d).Test for saturation and unsaturation.
- e). Identification of functional groups
 - i. Carboxylic acid
 - ii. Phenols
 - iii. Aldehydes
 - iv. Ketones
 - v. Esters
 - vi. Carbohydrates
 - vii. Primary amines
 - viii. Amides

COURSE OUTCOME:

At the end of the course, the learners will be able to

- ❖ Apply the principles of titrimetry
- ❖ Familiarize the concepts of indicator and dilution
- ❖ Determine the concentration of different solution
- ❖ Detect the various functional group

Scheme of Valuation

Record	- 05 Marks
Volumetric Analysis	- 25 Marks

Organic Analysis - 30 Marks

REFERENCE BOOKS :

1. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 1996.
2. N.S. Gnanapragasam and G. Ramamurthy, Organic chemistry – Lab manual, S. Viswanathan, Co. Pvt. Ltd., 1998.
3. J.N. Gurtu and R. Kapoor, Advanced Experimental Chemistry (Organic), S. Chand and Co., 1987.

SEM-IV:ALLIED COURSE-III: ALLIED CHEMISTRY-III		
Course Code : U4R1CHAC6		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 3		External Marks : 75

OBJECTIVES:

- ❖ To study the chemistry of coordination compounds and metallic bond
- ❖ To learn the concept of aromaticity and electronic effect
- ❖ To have knowledge of types for organic reaction and chemotherapy
- ❖ To study the importance of colloids.
- ❖ To know the concept of chemical equilibrium and catalysis

UNIT – I: COORDINATION CHEMISTRY AND METALLIC BOND 12 Hrs

1.1. Coordination Chemistry: Nomenclature of mononuclear complexes – Werner, Sidgwick and Pauling's Theory. Biological role of Haemoglobin and Chlorophyll.

1.2. Metallic Bond: Electron gas, Pauling and Band Theories. Semiconductors – Intrinsic and Extrinsic, n and p-type super conductors.

UNIT-II: ELECTRONIC EFFECTS, AROMATICITY 12 Hrs

2.1. Electron Displacement Effects- Inductive effect – relative strengths of aliphatic acid and alkyl amines, resonance – condition for resonance, consequences of resonance, hyper conjugation – definition and examples- steric effect.

2.2. Aromaticity – Conditions – Huckel's rule - aromaticity of benzene, furan, thiophene, pyrrole and pyridine.

2.3. Substitution reactions- mechanism of nitration, halogenation, sulfonation, Friedel Crafts alkylation and acylation of benzene.

UNIT – III: CHLORO COMPOUNDS, CHEMOTHERAPHY AND NAME**REACTIONS 11 Hrs**

3.1. Chloro compounds: Preparation and uses of Dichloromethane, Chloroform, Carbon tetrachloride, Freons, DDT and BHC.

3.2. **Chemotherapy:** Sulpha drugs-structure, preparation and uses of sulphapyridine, sulphathiazole and sulphadiazine, Antibiotics –Structure and uses of penicillin–G and Chloromycetin.

3.3.**Name reactions:** Benzoin,Perkin,Cannizaro, Reimer-Tiemann and Kolbe's reactions.(Mechanism not necessary)

UNIT – IV: SOLID STATE AND COLLOIDS**11 Hrs**

4.1 Solid State: Types of solids- crystalline and amorphous, unit cell, simple, body centered and face centered cubes, symmetry elements, seven crystal systems, Bragg's equation, Weiss indices and Miller indices.

4.2. Colloids: Definition, differences between true solution, colloidal solution and suspension, principle, applications -Electrical properties – Electrophoresis and Electro osmosis (definition and uses only) - protection of colloids – Gold number- medicinal applications of colloids.

4.3. Emulsion and Gels: definition, types, preparation, and applications.

UNIT – V: CHEMICAL KINETICS, CHEMICAL EQUILIBRIUM AND CATALYSIS**11 Hrs**

5.1 Chemical Kinetics: Order, rate, molecularity of the reaction and rate constant, determination of order of the reaction, activation energy, effect of temperature on reaction rate.

5.2 Chemical Equilibrium: Criteria of homogeneous and heterogeneous equilibria. Decomposition of HI and PCl_5

5.3 Catalysis: Catalysis – Importance of catalysis. Types of catalysis - Homogeneous and heterogeneous catalysis, factors affecting catalysis. Definitions of catalytic promoter, catalytic inhibitor, catalytic poison. Theory of catalysis - Intermediate compound theory. Acid-base and enzyme catalysis- definition and examples

UNIT -VI: LATEST LEARNING'S (FOR CIA ONLY)**03 Hrs**

Latest development related to the course during the semester concerned

COURSE OUTCOME:

At the end of the course, the learners will be able to

- ❖ Understand the chemical bonding and coordination compounds
- ❖ Learn the basic reaction pathway and organic reaction

- ❖ Get knowledge on some drugs and their functions
- ❖ Know nature of substance and importance of Solid, colloids,
- ❖ Understand the rate of reaction, kinetics and types of catalysis

TEXT BOOKS:

1. P.L. Soni – “Text book of Inorganic Chemistry. S. Chand & Co., New Delhi (2013)(**UNIT-1**)
2. P.L. Soni and H.M. Chawla – “Text Book of Organic Chemistry” – 28th Ed., (2014) Sulthan and Chand company, New Delhi (**UNIT II, UNIT III**).
3. B.R. Puri, L.R. Sharma and S. Pathania – Principles of Physical Chemistry: Shoban Lal Nagin Chand and Co., New Delhi, 2013 (**UNIT IV, UNIT V**).

REFERENCES:

1. R. D Madan – “Modern Inorganic Chemistry” 3rd revise edition (2014), S. Chand & Co Pvt Ltd.
2. A .K. Srivastava –“Organic Chemistry” – 1st Ed.,(2002) – New Age International Publishers, New Delhi.
3. B. R. Puri and L.R. Sharma – Principles of Inorganic Chemistry: Shoban Lal Nagin Chand and Co., New Delhi (2017).
4. R.L. Madan, G.D. Tuli, “Simplified Course in Physical Chemistry”, 5th revised and enlarged edition, S.Chand & Co., New Delhi, 2009.

SEMESTER-V: CORE COURSE-VIII: OPTICS		
Course Code : U5R1PHCC8		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- ❖ To study about the principles of geometrical and physical optics
- ❖ To understand the interference, diffraction and polarization of light
- ❖ To understand the aberration in lenses.
- ❖ To understand basic principles of optical instruments.
- ❖ To understand the working of optical instruments.

UNIT-I: INTERFERENCE**12 Hrs**

Principle of Superposition – Interference –Theory of interference - Young's Double slit experiments–Fresnel biprism – Experimental arrangement –Determination of wavelength of light-plane parallel film-Interference due to reflected light-Variable thickness film(Air wedge) — Theory of Newton's Rings -Michelson interferometer and its applications – Determination of wavelength and thickness of thin transparent sheet – Fabry -Perot interferometer-Determination of wavelength and difference in wavelength.

UNIT-II: DIFFRACTION**12 Hrs**

Fresnel's diffraction–Diffraction at a (1) circular aperture (2) Straight edge (3) narrow wire.– Fraunhofer's diffraction at a single slit and Double slit–Missing orders in a Double slit - Diffraction pattern–Theory of the plan transmission grating-Oblique incidence–Overlapping of spectral lines– prism and grating spectra – Resolving power of a grating – Dispersive power of a grating.

UNIT-III: POLARIZATION**11 Hrs**

Polarization of transverse waves –Nicol prism–Nicol prism as an analyzer and polarizer– Huygens's explanation of Double refraction in uniaxial crystals–Double Image polarizing prisms–Elliptically and circularly polarized light – Production and detection – Quarter wave and half wave plate – Babinet's compensator–Optical activity–Fresnel's explanation of optical activity–Laurent's Half shade polarimeter.

UNIT- IV: ABERRATIONS**11 Hrs**

Aberration-Spherical Aberration in a Lens-Reducing Spherical Aberration- Curvature of the field -distortion- Dispersion by a prism - Chromatic Aberration - Achromatic lenses and condition forAchromatism when two lenses are in contact – Achromatism of a camera Lens.

11 Hrs

UNIT - V: EYEPIECE AND RESOLVING POWER OF OPTICAL INSTRUMENTS

Field lens - Ramsden's eyepiece- Huygens's eyepiece and its cardinal points – comparison between Hygen's and Ramsden Eyepiece. Resolving power – Rayleigh's criterion of resolution .Resolving power of a (i) telescope (ii) Prism (iii) Grating – Dispersive power of a grating.

UNIT-VI: LATEST LEARNING**3Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FORSTUDY:

1. Text Book of Optics by Brijlal and Subramaniam and avadhanulu. M.N, S. Chand and Company New Delhi (2012).
2. Optics by Khanna and Gulati Mc Graw Hill Education Ltd New Delhi (2017).
3. Optics and spectroscopy by R. Murugesan and Sivaprasath Kiruthiga. S.Chand and co Ltd(2010).

BOOKS FORREFERENCE:

1. Optics – Jenkins and White, McGraw Hill (1976).
2. Optics – Ajoy Chatak, Tata McGraw Hill Education Private Limited (2009).

COURSE OUTCOME:

On completion of this course, the students will be able to

- ❖ Understands the aberration in lenses
- ❖ Understand the working of optical instruments like eyepieces in physics lab
- ❖ Learn the concepts of dispersion of light, interference, diffraction and polarization of light waves and their applications
- ❖ Study the different aberrations of lens and learn different methods of minimizing the aberrations of lens.
- ❖ Understanding the physics concepts behind the mechanism of Fresnal's biprism and Mihelson's interferometer.

SEMESTER-V: CORE COURSE-IX: ATOMIC AND NUCLEAR PHYSICS		
Course Code : U5R1PHCC9		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- ❖ To study about the properties of positive rays and negative rays.
- ❖ To study the various quantum state
- ❖ To study about Fine Structure of Spectral Lines and X-rays.
- ❖ To study the basic properties of nucleus
- ❖ To understand the basic concepts of nuclear reactors

UNIT-I: CATHODERAYS AND POSITIVE RAYS**11 Hrs**

Cathoderays: properties – e/m of cathoderays – Milliken's oil drop method – Positive rays – Properties – e/m of Positive rays: Thomson's parabola method – Aston's and Bain's bridge – Determination of critical Potential – Franck and Hertz's experiment – Davison and Goucher method.

UNIT-II: VECTOR ATOM MODEL**12 Hrs**

Various quantum numbers, L-S and j-j Couplings – Pauli's exclusion principle – electronic configuration of elements and periodic classification – magnetic dipole moment of electron due to orbital and spin motion – Bohr magneton – Stern and Gerlach experiment – Stark effect.

UNIT-III: FINE STRUCTURE OF SPECTRAL LINES**11 Hrs**

Special terms and notations – selection rules – intensity rule and internal rule – Alkali spectra – Fine structure in Alkali spectra – spectrum of Helium – Zeeman effect – Larmor's theorem – Debye's quantum mechanical explanation of the normal Zeeman effect – Anomalous Zeeman effect – theoretical explanation, Lande's 'g' factor and explanation of splitting of D₁ and D₂ lines of sodium – Paschen Back effect

UNIT-IV: GENERAL PROPERTIES OF NUCLEI**12 Hrs**

Review of basic properties of nuclei – mass, radius, binding energy, and nuclear moments – isotopes – isobars – isotones – radioactivity – cyclotron – Betatron – Geiger Muller counter – cloud chamber – Q-value of nuclear reaction – discovery of neutron, positron.

UNIT-V: NUCLEAR MODELS**11 Hrs**

Liquid Drop Model – application to fission, fission fragments, neutrons in fission process – nuclear energy – thermo nuclear reactions – atom bomb.

Shell Model – magic numbers – spin orbit coupling – Basic ideas of a nuclear reactor.

Bethe's theory of nuclear fusion – Solar energy – hydrogen bomb.

Basic classification of subatomic particles– photons, leptons– meson – baryons.

UNIT-VI: LATEST LEARNING**3Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. R.Murugesan, Kiruthiga Sivaprassath, Modern Physics, S. Chand & Co. Ltd., New Delhi, 2014..
2. Brijlal Subramanian and Jivan Seshan, Atomic and Nuclear Physics, S. Chand and co Ltd, New Delhi, 2006.

BOOKS FOR REFERENCE:

1. Arthur Beiser and Shobit Mahajan, Concepts of Modern Physics, Tata McGraw Hill, 2009.
2. J.B.Rajam, Modern Physics for Degree Students, 3rd Ed., S. Chand and Co., New Delhi, 1967.

COURSE OUTCOME:

On completion of this course, the students will be able to

- ❖ Understand the Cathode ray and Positive ray properties
- ❖ Acquire the ideas of electrons are transfer from one cell to another cell
- ❖ Perceive the fine structure based energy level diagram
- ❖ Understand the properties of atoms, which are mainly due to their electron configuration.
- ❖ Understand the atomic nuclei, constituents of nuclei and their interactions.
- ❖ Understand the nuclear accelerator and reactor

SEMESTER-V: CORE COURSE-X: DIGITAL ELECTRONICS		
Course Code : U5R1PHCC10		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- ❖ To understand the number systems and logic gates.
- ❖ To know the basic laws of Boolean Algebra.
- ❖ To understand the simplification of Logical Expressions..
- ❖ To study the sequential and combinational digital system.
- ❖ To learn about basic concepts of memories.

UNIT-I: NUMBER SYSTEMS AND LOGIC GATES**12 Hrs**

Introduction to decimal, binary, octal, hexadecimal number systems – Interconversions –

One's and two's complements – Simple binary arithmetic operations – Addition, subtraction and multiplication – Binary subtraction using one's and two's complements – Positive and negative logic – Basic and derived logic gates, symbols and their truth tables – AND, OR, NOT, NAND, NOR, XOR, and XNOR – Universality of NAND and NOR gates.

12 Hrs**UNIT-II: BOOLEAN ALGEBRA AND SIMPLIFICATION OF LOGIC EXPRESSIONS**

Boolean algebra – Basic laws of Boolean algebra – De-Morgan's theorems Reducing Boolean expressions using Boolean laws – SOP and POS forms of expressions miniterms and maxterms – Karnaugh map simplification (2, 3 variables only).

UNIT-III: COMBINATIONAL DIGITAL SYSTEMS**11 Hrs**

Half and full adders – Binary address – Half and full subtractors – Binary subtractor Two's complement adder / subtractor circuits – Decoder & Encoder (basic ideas only) – Multiplexer (4:1) – Demultiplexer (1:4)

UNIT-IV: SEQUENTIAL DIGITAL SYSTEMS**12 Hrs**

Flip flop – RS – clocked RS – T and D flip flops – JK and master slave flip flops – Counters – Four bit asynchronous ripple counter – Ring counter – Synchronous counter – Decade counter – Shift registers – SISO shift registers (4-bit)

UNIT-V: MEMORIES**10 Hrs**

Introduction – Semiconductor memories – Memory addressing – ROMs – PROMs and EPROMs – Random access memory – Dynamic random access memory – Programmable logic arrays.

UNIT-VI: LATEST LEARNING**3 Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. Digital Principles and Application, A.P. Malvino, D.P. Leach, IV Edition, McGraw Hill, New Delhi, 1986.
2. Electronics devices and circuits. Salivahanan. S, Suresh kumar. N and Vallavaraja. A, Tata McGraw Hill Publishing Company Private limited, New Delhi.

BOOKS FOR REFERENCE:

1. Digital Electronics, W.H. Gothmann, Prentice Hall of India, Pvt, New Delhi 1996.
2. Fundamentals of Digital Electronics and Microprocessors, Anokh Singh, A.K. Chhabra, S. Chand & Co, New Delhi, 2003

COURSE OUTCOME:

On completion of this course, the students will be able to

- ❖ Understand the structure of various number system and basic logic gates.
- ❖ Ability to design and solve the Boolean Algebra simplification and Karnaugh Maps.
- ❖ Develop skill to build and troubleshoot combinational digital circuits.
- ❖ Ability to construct sequential circuits and to design counters.
- ❖ Learn the working principle of Shift Register and its types.

SEMESTER-VI: CORE COURSE-XI: MAJOR PRACTICAL-III (GENERAL AND ELECTRONICS)		
(ANY FIFTEEN EXPERIMENTS - Choosing a Minimum of Six Experiment from Each Part)		
Course Code : U6R1PHCC11P		Max. Marks : 100
Hours/Week : 5		Internal Marks : 40
Credit : 5		External Marks : 60

OBJECTIVES:

To motivate and educate the students to acquire skill in physics and Electronics Experiments.

(A). General Experiments

1. Young's Modulus - Uniform bending Koenig's method
2. Spectrometer- i-i' curve.
3. Spectrometer- Grating minimum deviation and dispersive power.
4. Spectrometer- Cauchy's constants.
5. Spectrometer- Fraunhofer lines.
6. Field along the axis of a coil- determination of μ_0 .
7. Field along the axis of a coil- Moment of a Magnet
8. Potentiometer- EMF of a thermocouple.
9. Potentiometer- High range voltmeter calibration.
10. Ballistic Galvanometer - Figure of merit.
11. Series Resonance Circuits.
12. Parallel Resonance Circuit

(B). Electronics Experiments

1. Regulated power supply using Zener, Percentage of regulation.
2. Single stage - RC coupled amplifier - Transistor.
3. Hartley oscillator using transistor.
4. Astable multivibrator.
5. FET Characteristics.
6. Logic gates - AND, OR and NOT gates using discrete components - Truth table.
7. Universal gates NAND/NOR and basic gates from Universal gates.
8. Adder and Subtractor - Half and Full.
9. BCD to 7 segment decoder - 7 segment LED display.
10. Op - Amp - Adder and Subtractor.
11. Demorgan's theorem and Boolean algebra.
12. Flip Flop using gates.

REFERENCE BOOKS:

1. A textbook of practical Physics – M.N. Srinivasan and others – Sultan Chand & Sons, New Delhi.
2. Practical Physics, S. Somasundaram, V. Balachandran, S. Padmanathan, Apsara Publications, Tiruchirapalli.
3. Practical Physics – A. Dhana Lakshmi and K.R. Paramasivam – Apsara Publication, Tiruchirapalli.

COURSE OUTCOME:

On completion of the course the students will be able to understand a set of physical laws by using appropriate equipments through experiments.

SEMESTER-VI: CORE COURSE-XII: MAJORPRACTICAL-IV Any 12 experiments choosing a minimum of 5 from each section		
Course Code : U6R1PHCC12P		Max. Marks : 100
Hours/Week : 5		Internal Marks : 40
Credit : 5		External Marks : 60

OBJECTIVES:

To motivate and educate the students to acquire skill in Microprocessor and C-Programming

Section – A – Microprocessor 8085.

1. 8-bit addition and 8-bit subtraction.
2. 8-bit multiplication and Division.
3. Conversion from decimal to hexadecimal system.
4. Conversion from hexadecimal to decimal system.
5. Data transfer.
6. Find the smallest and largest number in a given Array.
7. Arrange the ascending and descending order of given number.
8. Interfacing – Stepper motor.
9. Interfacing – Wave form generation.
10. Interfacing – Traffic light control.

Section – B- C Programing

1. Average of a set of numbers.
2. Conversion of Fahrenheit to Celsius.
3. Solving quadratic equation.
4. Finding the factorial using recursion.
5. Add and subtract two matrices.
6. Find the smallest and largest element in an array.
7. Sorting a set of numbers in ascending/ descending order.
8. arrange the names in alphabetical order.
9. Addition, Subtraction and Multiplication of matrices.
10. Fibonacci Series.

REFERENCE BOOKS:

1. A textbook of practical Physics – M.N. Srinivasan and others – Sultan Chand & Sons, New Delhi.
2. Practical Physics, S. Somasundaram, V. Balachandran, S. Padmanathan, Apsara Publications, Tiruchirapalli.
3. Practical Physics – A. Dhana Lakshmi and K.R. Paramasivam – Apsara Publication, Tiruchirapalli.

COURSE OUTCOME:

On completion of the course the students will be able to understand an interfacing microprocessor and C- programming

SEMESTER-VI: CORE COURSE-XIII: ELEMENTS OF THEORETICAL PHYSICS		
Course Code : U6R1PHCC13		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- ❖ To understand the particle behavior in the system
- ❖ To understand Lagrangian and Hamiltonian formulation
- ❖ To understand the particle behavior using Lagrangian and Hamiltonian formulation
- ❖ To understand the wave nature and wave properties
- ❖ To understudy the basic concepts of photo cells

UNIT-I: LAGRANGIAN FORMALISM**11 Hrs**

Mechanics for a system of particles – Constraints – Generalized co-ordinates – transformation equations Configuration space – Principle of virtual work – D’ Alembert’s principle – Lagrange’s equations for systems containing dissipative forces – Applications of Lagrange’s equations – Atwood’s machine – Lagrangian formulation of conservation theorems.

UNIT-II: HAMILTONIAN FORMALISM**12 Hrs**

Phasespace–Generalized momentum– Cyclic co-ordinates –Conservation theorem for generalized momentum– Conservation theorem for energy – Hamiltonian’s function – Hamiltonian’s equation – Hamiltonian’s equations in different co-ordinates system – Harmonic oscillator – Compound pendulum.

UNIT-III: DUAL NATURE OF MATTER**11 Hrs**

DeBroglie concept of matter waves – DeBroglie wavelength – Wave velocity and group velocity for the DeBroglie waves–Experimental study of matter waves: Davison and Germer experiment – G.P. Thomson’s experiment for verifying De Broglie relation – Heisenberg’s uncertainty Principle – Electron microscope – Gamma ray microscope.

UNIT-IV: SCHRÖDINGER’S WAVE MECHANICS**12 Hrs**

Basic postulates of wave Mechanics–Development of Schrödinger wave equation–Time independent and dependent forms of equations– Properties of wave function–Orthogonal and normalized wave function - Eigenfunction and Eigenvalues–Application of Schrodinger equation – particle in a box–Linear harmonic oscillator– The barrier penetration problem.

UNIT-V: PHOTOELECTRIC AND COMPTON EFFECTS**11 Hrs**

Photoelectric effect–Lenard, Richardson and Compton experiments–laws of photoelectric emission – Einstein’s photoelectric equation– Millikan’s experiment–Determination of Planck’s constant–photoemissive cell–photovoltaic cell–photoconductive cell–photo multiplier – Compton effect – Theory–Experimental Verification.

UNIT-VI: LATEST LEARNING**3Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. R. Murugesan, S. Chand & Co. New Delhi. 2003.
2. Classical Mechanics. Gupta, Kumar & Sharma. PragathiPrakasan, Meerut. 2001.

BOOKS FOR REFERENCE:

1. Classical Mechanics. H. Goldstein. Narosa Publishing House, 2001.
2. Classical Mechanics. J.C. Upadaya., Himalaya Publication, 2014.

COURSE OUTCOME:

On completion of this course, the students will be able to

- ❖ Perceive the particle behaviour when we apply the force
- ❖ Understand the particles behaviour for different coordinate
- ❖ Understand the behaviour dual nature of matter (Particle and Energy)
- ❖ Perceive the Schrodinger wave mechanics
- ❖ understand the concept of photo electric effect.

SEMESTER-VI: CORE COURSE-XIV: MICROPROCESSOR AND ITS APPLICATION		
Course Code : U6R1PHCC14		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 5		External Marks : 75

OBJECTIVES:

- ❖ To study about the microprocessor 8085
- ❖ To understand basic architecture of 8-bit microprocessor
- ❖ To learn the assembly language programming in 8085
- ❖ To know the interfacing techniques with the peripherals
- ❖ To understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors

UNIT I: MICROPROCESSOR ARCHITECTURE**11 Hrs**

Intel 8085-ALU – timing and control unit-Registers-Data and address buses – Pin configuration – opcode and operands – Instruction and data formats – Addressing modes

UNIT-II: INSTRUCTION SET FOR 8085.**11 Hrs**

Intel 8085 instructions – Instruction cycle –fetch operation; execute operation-machine cycle and state-instruction and dataflow-timing diagram-timing diagram for op-code fetch cycle memory read-I/O read - memory write - I/O write.

UNIT-III: ASSEMBLY LANGUAGE PROGRAMMING**12 Hrs**

8-bit addition – 8- bit subtraction– 8-bit multiplications – 8-bit division– sum of series– Data transfer – addition of multibyte numbers – smallest numbers in an array– largest numbers in an array– arrays in ascending order – array in descending orders – square root of a numbers

UNIT-IV: PERIPHERAL DEVICES AND THEIR INTERFACING**11 Hrs**

Address space partitioning-memory and I/O interfacing-data transfer schemes - I/O ports-interrupts of Intel 8085 - Programmable peripheral interface 8255 - DMA controller 8257 - programmable timer/Counter8253 - interfacing of A/D converter - DAC 0800.

UNIT-V: MICROPROCESSOR APPLICATIONS**12 Hrs**

Delay subroutine -7 segment LED display - measurement of frequency - water level indicator-interfacing of stepper motor - microprocessor based traffic control - to generate a square wave or pulse using I/O port.

UNIT-VI: LATEST LEARNING**3Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. B. Ram, Fundamentals of microprocessor and microcontroller-Dhanpat Rai Publications(p) Ltd.,New Delhi,2013
2. A.P. Mathur, Introduction to microprocessor, Tata McGraw – Hill education, 1989.

BOOKS FOR REFERENCE

1. L.A. Laventhal, Microprocessor organization and architecture. Prentice hall india.,2017.
2. W.H.Gothmann, Digital Electronics, Prentice Hall of India, Pvt. Ltd., New, Delhi 1996.
3. R.S.Ganokar-Microprocessor Architecture,programming and Application with the 8085.Penram International Publishing (India)Pvt Ltd.Mumbai 2017.

COURSE OUTCOME:

On completion of this course, the students will have

- ❖ understand the basic of intel 8085 microprocessors architecture and its instruction set
- ❖ write assembly language programme for the intel 8085.
- ❖ work to with standard microprocessor real time interfaces
- ❖ design system using memory chips and peripheral chips for 8 bit 8085 Microprocessor
- ❖ Understand and devise techniques for faster execution of instructions, improve speed of operations and enhance performance of microprocessors.

SEM – V MAJOR BASED ELCTIVE COURSE – I SOLID STATE PHYSICS		
Course Code : U5R1PHMBE1		Max. Marks : 100
Hours/Week : 4		Internal Marks : 25
Credit : 4		External Marks : 75

OBJECTIVES:

- ❖ To understand the chemical bonds and the properties of materials.
- ❖ In-depth knowledge of at least one specialization area within the field of solid state physics
- ❖ To develop knowledge in material science and to understand the relationship Between properties and material characteristics.
- ❖ To acquire knowledge in behavior of various materials
- ❖ To study the function of various Applications of superconductor and metal forming process

UNIT – I : CRYSTAL STRUCTURE**10 Hrs**

Types of crystals-space lattice-basis- unit cell and lattice parameters – Bravaislattices-Lattice planes and Miller indices-inter planar spacing in a cubic latticelattice-SC – BCC – FCC- Sodium chloride and Diamond crystal structure –Bonding of solids (Ionic , Covalent , Metallic , Hydrogen and Van der Waal).

UNIT –II: SUPER CONDUCTING MATERIALS**9 Hrs**

Superconductivity – Properties-Meissner's effect- London equations - types ofsuperconductors Type I and Type II –High temperature superconductors -Josephson effects and its applications - Applications of superconductor.

UNIT - III: NEWMATERIALS**9 Hrs**

Metallic glasses – Fibre in forced plastics–Metalmatrixcomposites–Materialfor optical sources and detectors – Fiber optic materials and their applications – Display materials – Acoustic materials and their applications–SAW materials–Biomaterials–High temperature superconductors.

UNIT – IV: SMART MATERIALS**9 Hrs**

Metallic glass and its applications — Fiber reinforced metals – SAW Materials and its applications – Biomaterials – Ceramic-Nuclear engineering materials-Nano phase materials - SMART materials- Conducting polymers- Optical materials - Fiber optic materials and their applications.

UNIT – V: MECHANICAL BEHAVIOR OF MATERIALS**9 Hrs**

Different mechanical properties of engineering materials – creep – Fracture technological properties – factors affecting mechanical properties of material-Heat treatment-cold and hot working-types of mechanical tests- metal forming process deformation of metals- Deformation of crystals and polycrystalline materials.

UNIT-VI: LATEST LEARNING**2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

Books for study:

1. Dr. M.N. Avadhanulu, Material science, S.Chand& Company, New Delhi, 2014.
2. Dr.M.Arumugam, Material science, Anuradha publishers, 2013.

Books for Reference:

1. V. Raghavan, Material Science and Engineering ,Printice Hall India.,2014.
2. Jyotirmoy Guha,Solid statephysics,M/S Books and Allied Lts,kolKata.,2018.

COURSE OUTCOME:

On completion of this course ,the students Will able tor

- ❖ understanding the concept of bond structure classifications based on the physical mechanism of energy conduction process and its associated theoretical knowledge.
- ❖ Idea to form super conductor for specific needs under controlled conduction of electric and thermal energies.
- ❖ conceptual idea of magnetic and fiber optics and saw material clarifications.
- ❖ introducing the materials with the knowledge of synthesis procedures and its need for modern applications.
- ❖ explain the different mechanical behavior of materials systems.

SEM – V. MAJOR BASED ELECTIVE COURSE – II COMPUTER PROGRAMMING – C LANGUAGE		
Course Code : U6R1PHMBE2		Max. Marks : 100
Hours/Week : 4		Internal Marks : 25
Credit : 4		External Marks : 75

OBJECTIVES:

- ❖ To understand the basic concepts of C programming.
- ❖ To write some simple programs and some basic idea about flow-charting and algorithms.
- ❖ To understand the concepts of Arrays and Functions
- ❖ **To develop skills in pointer and Structures**
- ❖ **To be able to write different programmes using codes.**

UNIT -I: INTRODUCTION TO C**9 Hrs**

Introduction: Importance of C – Basic structure of C Programs – Programming Style – Character set, Keywords and Identifiers – Constants – Data Types – Variables – Declarations of Variables – Assigning Values of variables.

Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Comma Operators – Arithmetic expressions – Procedure and Associativity.

UNIT -II: CONTROL STRUCTURES**9 Hrs**

Input Output Operator: getchar, putchar, Formatted output (printf) and Formatted input (scanf).

Control Structure: Decision making and branching statements (if, if-else, nested if, else if ladder, switch, go to, break and continue) – Decision making and looping statements (while, do- while, for).

UNIT - III: ARRAYS AND FUNCTIONS**9 Hrs**

Arrays: One – dimensional and two dimensional arrays, declaring arrays – initializing arrays.

Functions: Basic functions – Return values and their types – calling a function – external variables and scope rules – Recursion.

UNIT - IV: STRUCTURES AND POINTERS**10 Hrs**

Structures: Definition and initialization – Arrays of Structures – Arrays within structures – Structures and functions – Unions.

Pointers: Introduction to pointers – declaring pointer variables - initialization of pointer variables – Files- definition, opening and closing of files- input/output operation on files.

UNIT –V:**9 Hrs**

Development of algorithm, flow chart and program for the following problems.

1. Average of a set of numbers.
2. Conversion of Fahrenheit to Celsius.

3. Solving quadratic equation.
4. Finding the factorial using recursion.
5. Addition and subtraction of two matrices.
6. Finding the smallest and largest element in an array.
7. Sorting a set of numbers in ascending/ descending order.
8. Arranging the names in alphabetical order.

UNIT-VI: LATEST LEARNING**2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY

1. Programming in ANSI C – E. Balagurusamy – Tata McGraw Hill, 2012.
2. Programming with C – Venugopal K. R. and Prasad S. R., Tata McGraw Hill, 2002.

BOOKS FOR REFERENCES:

1. Schaum's Outline Series Theory and Problems of Programming with C – Byron S. Gottfried, McGraw Hill International, 2010.
2. Vengopal and Sundeeep, Programming With C – Tata McGraw Hill Education, India Pvt. Ltd. 2016.

COURSE OUTCOME:

On completion of this course, the students will be able to

- ❖ understand the lexical elements in 'c' - programming.
- ❖ be aware of different types of operators and expressions in c language.
- ❖ choose the loops and decision making statements to solve the problem
- ❖ implement different operation on arrays.
- ❖ use function to solve the given problems

SEM – VI. MAJOR BASED ELECTIVE COURSE – III NANO-SCIENCE		
Course Code : U6R1PHMBE3		Max. Marks : 100
Hours/Week : 4		Internal Marks : 25
Credit : 4		External Marks : 75

OBJECTIVES:

- ❖ To acquire knowledge about the Properties and structure of nanomaterials
- ❖ To study about fabrications and characterization of nanomaterials
- ❖ To learn the evaluation techniques of nanomaterials through microscopy
- ❖ In-depth knowledge of at least one specialisation area within the field of nanoscience
- ❖ Proficiency in translating this knowledge into useful technological applications
- ❖ Sufficient scientific background to undertake research

UNIT-I: NANOTECHNOLOGY**9 Hrs**

Nanomaterials – basis of nanomaterials -Nanotechnology – four generations of Nano-technology-thermal, optical, electrical and magnetic properties of nanomaterials-Elementary ideas of Nanostructures.

UNIT-II: METHODS OF NANOMATERIALS**9 Hrs**

Classification of Nanomaterials – technique of preparation – bottom up methodology (Sol-Gel preparation technique) -Top down methodology-fullerenes-Properties of fullerenes.

UNIT-III: CARBON NANOTUBES**9 Hrs**

Types of carbon Nanotubes -single walled (SWNT) Nanotubes - multi walled (MWNT) Nanotubes - properties - kinetic property - electrical property - Chemical, mechanical applications –current applications.

UNIT-IV: QUANTUM DOTS, WIRE AND WELL**9 Hrs**

Quantum dot – fabrication – optical properties – quantum dot for tumor targeting–quantum wire–quantum well – fabrication – applications

UNIT-V: EVALUATION TECHNIQUES**10 Hrs**

Scanning Probe Microscope-Types- Tunnelling Electron Microscope (TEM)-Atomic Force Microscopy (AFM)-Scanning Tunneling Microscopy (STM).

UNIT-VI: LATEST LEARNING**2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. S. Shanmugam, Nano Technology, MJP Publishers, First edition, 2011.
2. Nano Technology, Lynn E. Foster, Pearson Education, Inc. and Dorling Kindersley Publishing, Inc, Fifth edition, 2011.
3. Introduction to Nano Technology, Charles P. Poole, Jr., Frank J. Owens, Published by

John Wiley & Sons, Inc., 2009.

BOOKS FOR REFERENCES:

1. K. K. Chattopadhyay, Introduction to NanoScience and Technology, PHI, New Delhi, 2011

OUT COME:

On completion of this course, the students will have

- ❖ graduate can reflect autonomously on a variation of different problems related to nanoscience.
- ❖ understand new discoveries and developments based on nanoscience.
- ❖ gathering knowledge of the methods used in nanoscience and design.
- ❖ able to apply knowledge from various domains and specializations in nanoscience.
- ❖ fundamental physical scaling laws applied to understanding the properties of materials at the nanometre scale.

SEM – VI. MAJOR BASED ELECTIVE COURSE – IV ENERGY PHYSICS		
Course Code : U6R1PHMBE4		Max. Marks : 100
Hours/Week : 4		Internal Marks : 25
Credit : 4		External Marks : 75

OBJECTIVES:

- ❖ To understand the concepts of conventional and non-conventional energies
- ❖ To understand the availability and practical usage of solar energy in various forms and other alternative energy sources.
- ❖ To study the Biomass energy fundamentals.
- ❖ To know various types of Biomass utilization.
- ❖ To learn about other form energy source.

UNIT I: CONVENTIONAL ENERGY SOURCE**9 Hrs**

World's reserve – commercial energy sources and their availability – various forms of energy – renewable and conventional energy system – comparison – Coal, oil and natural gas – applications – Merits and Demerits

UNIT II: SOLAR ENERGY**9 Hrs**

Renewable energy sources – solar energy – nature and solar radiation – components – solar heaters – crop dryers – solar cookers – water desalination (block diagram) Photovoltaic generation – merits and demerits

UNIT III: BIOMASS ENERGY FUNDAMENTALS:**10 Hrs**

Biomass energy – classification – photosynthesis – Biomass conversion process

UNIT IV: BIOMASS UTILIZATION**9 Hrs**

Gobar gas plants – wood gasification – advantages & disadvantages of biomass as energy source

UNIT V: OTHER FORMS OF ENERGY SOURCES**9 Hrs**

Geothermal energy – wind energy – Ocean thermal energy conversion – energy from waves and tides (basic ideas)

UNIT-VI: LATEST LEARNING**2 Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. Renewable energy sources and emerging Technologies, by D.P. Kothari, K.C. Singal & Rakesh Ranjan, Prentice Hall of India Pvt. Ltd., New Delhi (2008)

BOOKS FOR REFERENCE:

1. Renewable Energy sources and their environmental impact – S.A. Abbasi and Nasema Abbasi PHI Learning Pvt. Ltd., New Delhi (2008)

COURSE OUT COME:

On completion of this course, the students will able to

- ❖ ability to know the power potential of the sun and its utility.
- ❖ understanding the experimental procedure of collecting solar energy.
- ❖ knowing various types of storage methods involving.
- ❖ knowing the other alternative sources for energy production.
- ❖ applying knowledge to fabricate solar cells for energy storage purpose.
- ❖ knowing other forms of energy which are existing in the nature.

MAJOR BASED EELCTIVE COURSE – V COMMUNICATION SYSTEMS		
Course Code : U6R1PHMBE5		Max. Marks : 100
Hours/Week : 4		Internal Marks : 25
Credit : 4		External Marks : 75

Objectives

- ❖ To know different aspects of communication.
- ❖ To understand the concepts of Analog communication.
- ❖ To understands basic condepts of Pulse communication.
- ❖ To ability to know the data communication.
- ❖ To acquire knowledge about fiber optical communication.

UNIT –I: BASICS OF COMMUNICATION**10 Hrs**

Communication systems- modulation- need for modulation- bandwidth requirements- noise- thermal agitation noise- noise calculations- signal to noise Ratio- noise figure- calculation of noise figure measurement of noise figure.

UNIT –II: ANALOG COMMUNICATION**9Hrs**

Amplitude modulation- frequency spectrum of AM wave- power relations in the AM wave- frequency modulation- mathematical representation of FM- frequency spectrum- phase modulation- comparisons: frequency and phase modulation, frequency and amplitude modulations.

UNIT –III: PULSE COMMUNICATION**9 Hrs**

Pulse communication- pulse modulation types- pulse amplitude modulation- pulse width modulation- pulse position modulation- pulse code modulation- telegraphy- telemetry.

UNIT –IV: DATA COMMUNICATION**9 Hrs**

Data communication systems- data transmission circuits- error detection and correction- interconnection requirements- modern classification- network and control considerations.

UNIT –V: FIBER OPTICAL COMMUNICATION**9 Hrs**

Optical fiber cables- losses in fibers- measurements of fiber characteristics- analog and digital modulation schemes- fiber optical communication systems- operating wavelength- emitter design- detector design fiber choice- future developments.

UNIT-VI: LATEST LEARNING**2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

Books for Study:

1. George Kennedy, Electronic communication system, McGraw-Hill international editions, 1987.
2. J. Wilson, J.F.B. Hawkes, Optoelectronics- An Introduction, Prentice hall of India, 1992.
3. G. Jose Robin & A. Ubald Raj, communication electronics, Indira publications, Martandam, 2002.
4. John Gower, Optical Communication Systems, Prentice Hall India Private Ltd, New Delhi, 1993.

Books for Reference:

1. Gerd Keiser, Optical fiber communications, McGraw Hill, Singapore, 2000
2. Joseph C. Palais, Fiber Optic Communications, Prentice Hall International, USA, 2001.
3. B.P. Lathi, Communication systems, Wiley Eastern Ltd, New Delhi, 1968

COURSE OUTCOME:

On completion of this course, the students will have

- ❖ Understanding the Amplitude Modulation and Demodulation techniques
- ❖ Apply the Skill in Frequency Modulation and demodulation techniques
- ❖ Expose the Knowledge in Pulse modulation.
- ❖ Learning the basic concepts of fiber optics and types of fiber
- ❖ Exposing the students to the data communication system

SEM – IV: SKILL BASED ELECTIVE COURSE – I LASER AND SPECTROSCOPY		
Course Code : U4R1PHSBE1		Max. Marks : 100
Hours/Week : 3		Internal Marks : 25
Credit : 2		External Marks : 75

OBJECTIVES

- ❖ To understand the principles of light.
- ❖ To understand the Concepts of Laser.
- ❖ To understand the working of laser in various field
- ❖ To updating the Knowledge Application of Laser.
- ❖ To understand the basic principles of spectroscopy

UNIT - I: INTERACTION OF LIGHT WITH MATTER**7 Hrs**

Introduction- Absorption - Optical Absorption in metals – dielectric and semi conductor – reflection – Trap – Excitons- colour centers – generation of colour centers – Luminescence - Photoluminescence

UNIT -II: FUNDAMENTAL OF LASER**7 Hrs**

Introduction-Basic principle- Laser Characteristics-Spontaneous emission – stimulated absorptionstimulatedemission-Meta stable state – Population inversion –pumping action – Laserapplications(any four)Helium– NeonLaser –Ruby Laser– CO₂Laser– SemiconductorLaser

UNIT -III: APPLICATIONS OF LASER**7 Hrs**

Laser cutting– welding–drilling– Hologram – Recordingandreconstruction ofhologram
Lasers in Surgery–Lasers in ophthalmology–Lasers in cancer treatment

UNIT -IV: LASERS IN COMMUNICATION**6 Hrs**

Optic fibrecommunication- Total internal reflection –Numerical aperture – Fiber modes – Single and multi modefibersBlock diagram of fibre optic communication system–Advantages of fibreoptic communication

UNIT-V: SPECTROSCOPY**7 Hrs**

Typesof spectra–Emissionandabsorptionspectra–Continuous,bandandline spectra– Solar spectrum–Ramaneffect– Explanation of Raman effect using simple quantum theory – Experiment – Applications – IR spectroscopy – UV spectroscopy – Sources – Detection – Properties and application.

UNIT-VI: LATEST LEARNING**2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOK FOR STUDY:

1. An introduction toLASERS– N. Avadhanulu, S. Chand &Company(2001)

BOOKS FOR REFERENCE:

1. Laser fundamentals–William T. Silfvast Cambridge University Press–Published in South Asia by foundation books, 23, Ansari Road, New Delhi 2015
2. LASER Theory and Application– K. Thyagarajan and A.K. Ghatak, Macmillan, India Ltd 2009.
- 3.

COURSE OUTCOME:

On completion of this course, the students will have

- ❖ Understanding the basic concept of light behavior
- ❖ Acquired the knowledge of laser
- ❖ Learning the basic concepts of LASER and application
- ❖ Applying knowledge to Laser in communication
- ❖ Exposing the students about spectroscopy

SKILL BASED EELCTIVE COURSE – V BIOMEDICAL INSTRUMENTATION		
Course Code : U5R1PHSBE2		Max. Marks : 100
Hours/Week : 3		Internal Marks : 25
Credit : 2		External Marks : 75

OBJECTIVES:

- ❖ To study the function of various transducers and electrodes in Biomedical instrumentation.
- ❖ To understand the working principles of various instruments in Medicine.
- ❖ To updating the knowledge in ultrasonic and X-Ray measurements in Medicine.
- ❖ To Understand the medical diagnosis and therapy.
- ❖ To interpret technical aspects of medicine.

UNIT-I: BIOELECTRICPOTENTIALS**7 Hrs**

Resting and action potentials-Propagation of action potentials-Bioelectric potentials: The electrocardiogram (ECG)-The electroencephalogram (EEG) –The Electromyogram (EMG)- Other Bioelectric potentials.

UNIT-II: BIOPOTENTIALELECTRODES**7 Hrs**

Electrode theory-Microelectrodes-Body surface electrodes-Needle electrodes-reference electrodes-pH electrode-Blood gas electrode-Specific ion electrode.

UNIT-III: CARDIOVASCULARMEASUREMENTS**7 Hrs**

Electrocardiography-ECG amplifiers-Electrodes & leads-ECG Recorder principles-Measurement of Blood pressure: Indirect measurement- Measurement of Blood flow and cardiac output.

UNIT-IV: NERVOUSMEASUREMENTS**6 Hrs**

Anatomy - Neuronal communication-Neuronal Receptors - Measurements from the nervous system-Neuronal firing measurements - EMG measurements - Computerized Axial Tomography.

UNIT-V: ULTROSONICANDXRAYMEASUREMENTS**7 Hrs**

Basic modes of transmission-Ultrasonic Imaging –Ultrasonic diagnosis- Ultrasonic transducers –Ophthalmic scans –Instrumentation for diagnosis –X rays-Special techniques.

UNIT-VI: LATEST LEARNING**2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKSFORSTUDY:

1. Bio-Medical Instrumentation, Dr. M. Arumugam. Anuradha agencies Publishers. Vidayalkaruppur. Kumbakonam RMS – 612606, 2018.
2. Introduction to Biomedical Instrumentation by, Mandeep Singh, Publishers PHI Learning private Ltd., 2010.

BOOKFORREFERENCE:

1. Biomedical Instrumentation and measurements by Leslie Cromwell, Fred.J.Weibell, Erich A. P feiffer, Prentice Hall India, Second Edition – 1990.

COURSE OUTCOME:

On completion of this course, the students will have

- ❖ explain the different medical imaging systems.
- ❖ analyze and evaluate the effect of different diagnostic and therapeutic method.
- ❖ have a basic understanding of medical terminology.
- ❖ understand the elements of risk for different instrumentation methods and basic electrical safety.
- ❖ understand the position of biomedical instrumentation in modern hospital care.

SEM – VI: SKILL BASED EELCTIVE COURSE – III ELECTRICAL HOMEAPPLIANCES		
Course Code : U5R1PHSBE3		Max. Marks : 100
Hours/Week : 3		Internal Marks : 25
Credit : 2		External Marks : 75

OBJECTIVES:

- ❖ To understand the basic basis principles of electricity.
- ❖ To learn about different types of wiring..
- ❖ To learn about Electrical Measuring Instruments.
- ❖ To understand the principle of Electrical Appliances.
- ❖ To study about the AC and DC Motor.

UNIT – I: SAFETY PRECAUTION**7 Hrs**

Electricity – Basic principles - Practical unit of electricity -International system (S.I) of units – Electric shock– Precautions to avoid electric shock– Rescue steps in electric Shock – methods of resuscitation - Electric Line Circuit Breaker (ELCB).

UNIT – II: WIRING**7 Hrs**

Wiring system – Electric supply to house and factories – Types of wiring– ISI Rules – Megger testing – Earthing. Electricity in house: Design for heating element– Electric iron, Table heater, Hot plate and Room heater.

UNIT – III: ELECTRICAL MEASURING INSTRUMENTS**7 Hrs**

Moving coil instruments– Voltmeter – Ammeter – Wattmeter– Kilowatt meter– Frequency meter–Multimeter.

UNIT – IV: ELECTRICAL APPLIANCES**6 Hrs**

Cooling appliances – Electric fan – Refrigerator – Air Conditioner – Air cooler.
Other electrical appliances: Electric bell – Buzzer – Incandescent lamp – Fluorescent lamp – LED lamp – Halogen lamp – Reverse osmosis purifier – Washing machine – Solar powered street lights.

UNIT – V: ELECTROMAGNETIC APPLICATION**7 Hrs**

Basics of Electromagnetic theory –Solenoid –Electric motor (AC& DC) –Electric generator – transformer – Backup power suppliers (UPS, Invertors) - Induction stove.

UNIT-VI: LATEST LEARNING**2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FORSTUDY:

1. A.L. Anwani and I. Anwani, Basic Electrical Engineering, DhanpatRai and Co (P) Ltd., Delhi, 2003. (Units 1to 5)
2. Sk.Gupta,electrical Home Appliances,GT Publications,,2016.

BOOKS FOR REFERENCE:

1. William D.Cooper, Electrical Instuments and Measurement Techniques, PHI Pvt Co., New Delhi, 1997. (Units 2,3 &4)

2. S.P.Bali, Consumer Electronics, Pearson Education, India, 2005.
3. B.L.Theraja, Textbook of Electrical Technology , Vol.1&2, S.Chand, 2005.

COURSE OUTCOME:

On completion of the course ,the students will be able to.

- ❖ find the safety precaution for shockproof method
- ❖ understand the wiring technical method
- ❖ Students acquire the knowledge of different parts of electrical measuring and its accessories
- ❖ Students learn to produce a good quality electrical appliance using different methods
- ❖ Construct, analyze and trouble shoot simple electromagnetic circuits

SEM – V: SKILL BASED ELECTIVE COURSE – II PHOTOGRAPHY		
Course Code : U5R1PHSBE4		Max. Marks : 100
Hours/Week : 3		Internal Marks : 25
Credit : 2		External Marks : 75

OBJECTIVES

- ❖ To acquire knowledge about parts of camera.
- ❖ To learn about film size and types of film..
- ❖ To get trained in taking still photograph, developing and printing.
- ❖ To understand the basic principles of enlarging and colour photography.
- ❖ To acquire knowledge about digital photography.

UNIT-I: CAMERA**6 Hrs**

Basic parts of the camera, three important controls of the camera, types of camera- Box camera, simple miniature camera, Modern reflex camera-TLR and SLR cameras

UNIT- II: FILMS-SIZES AND TYPES**7 Hrs**

Black and White films, types of film, Film sizes and negatives, interchangeable lenses.

UNIT-III: EXPOSURE AND PICTORIAL COMPOSITION**7 Hrs**

Exposure for photographing in artificial light, depth of field, depth of focus, exposure for taking photographs of moving subjects-shutter speed for moving objects-panning-practical hints for exposing.

UNIT-IV: DEVELOPING THE FILM**7 Hrs**

Basic principle in film developing-dish developing-tank developing-time and temperature control of developing.

7 Hrs**UNIT-V: PRINTING, ENLARGING, COLOUR AND DIGITAL PHOTOGRAPHY**

Contact printing-enlarging, techniques and practical hints on enlarging-primary and complementary colour-colour films-camera for colour photography-digital photography -choosing a digital camera-digital manipulation.

UNIT-VI: LATEST LEARNING**2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOK FOR STUDY:

1. O.P.Sharma, Practical photography.
2. Lee Forst-Hodder & Stoughton, Teach yourself Photography, U.K.

BOOK FOR REFERENCE:

1. Robert L. Kerns, "Photo journalism", PRENTICE Hall Inc, Engle wood Chiffs, N.J. 1990.
2. Julian Calder, John C Carrett, " The 35 mm Photographer's hand book", Marshall edition London, 1999.

COURSE OUTCOME:

On completion of this course, the students will be able to

- ❖ Produce a good quality photo using adobe photo software
- ❖ Acquired the knowledge of different parts of cameras and its accessories
- ❖ Ability to Know Exposure of Photography.
- ❖ Have the capability to comprehend the technological advancements in the usage of modern design tools to edit, print and design for variety of applications.
- ❖ Acquired Knowledge about Developing the Film.

SKILL BASED ELECTIVE COURSE – IV ASTROPHYSICS		
Course Code : U5R1PHSBE5		Max. Marks : 100
Hours/Week : 3		Internal Marks : 25
Credit : 2		External Marks : 75

Objectives

- ❖ To acquire the knowledge on the elements of space dynamics,
- ❖ To learn about solar system
- ❖ To learn about small bodies, universe and its neighbors and life in universe.
- ❖ To Understand the basic concepts of space dynamics, solar system: structure, activity and its features etc.
- ❖ To Understand the great number of diverse phenomena in the Universe through Physics like origin and nature of universe –subjects relevance to contemporary social issues.

UNIT-I: ELEMENTS OF SPACE DYNAMICS**7 Hrs**

Man's quest for space – the energy requirements – Rocket propulsion –suborbital flights – Artificial earth satellites – Lunar and planetary probes

UNIT-II: THE HEART OF THE SOLAR SYSTEM**7 Hrs**

Vital statistics of the Sun – the solar photosphere – the Fraunhofer lines –structure of solar atmosphere – the solar interior – Sunspots and solar activity – other features of the solar activity – Radio studies of the quiet Sun– Radio radiation of the distributed Sun.

UNIT-III : SMALL BODIES IN THE SOLAR SYSTEM**7 Hrs**

Asteroids – Meteorites – Comets as members of the Solar system – Physical properties of comets – Origin and evolution of comets – Space studies of comets – Meteors – an inventory of satellites – the large satellites – Medium, small and tiny satellites – Planetary rings.

UNIT-IV : OUR HOME AND THE NEAREST NEIGHBOUR**7 Hrs**

EARTH: Gross properties – internal structure – the terrestrial atmosphere –the Earth's magnetic field – motions – Solar terrestrial relations – the Earth in space – atmospheric circulation in the troposphere. MOON : Some basic facts – telescopic studies – internal structure – surface features – Origin of the Moon – the lunar environment – Solar and Lunar eclipses.

UNIT-V: LIFE IN THE UNIVERSE**6 Hrs**

Nature of life on Earth – A survey of objects in the Solar System – Pre-Mariner search for life on Mars – Post Mariner search for life on Mars – Life outside the Solar system – the search for life in the Universe.

UNIT-VI: LATEST LEARNING**2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY

1. Astrophysics of the Solar System – K.D.Abhyankar, University Press

Pvt. Ltd. Hyderabad, 1999.

COURSE OUTCOME:

On completion of this course, the students will be able to

- ❖ Apply the scientific thinking to the real world problems
- ❖ Qualitative analysis about the solar system and their members.
- ❖ Ability to know Elements of space Dynamics.
- ❖ Understand and demonstrate the formation of solar and lunar eclipses.
- ❖ Apply the knowledge and to communicate the scientific information's about universe, solar system, and life in Mars: pre Mariner and post Mariner.

INTER DISCIPLINAR COURSE – I BASICS OF ELECTRONICS		
Course Code :		Max. Marks : 100
Hours/Week : 2		Internal Marks : 25
Credit : 2		External Marks : 75

OBJECTIVES:

- ❖ To learn about the DC and AC circuits
- ❖ To study about the passive components and semiconductor devices.
- ❖ To understand the basic concepts of integrated circuits.
- ❖ The objective of this course is to introduce the students About the semiconductor devices.
- ❖ To familiarize the students about the transistor, FET and operational amplifier.

UNIT-I: DC CIRCUITS**4Hrs**

Introduction – Ohm's law – Specific resistance of material – Combination of resistance – Kirchoff's laws – Magnetic circuits - Electromagnetic induction

UNIT-II: AC CIRCUITS**4Hrs**

Generating of Alternating voltage – Vector representation of alternating quantities – AC series circuits – AC parallel circuits – Resonance circuits – Poly phase systems.

UNIT-III: PASSIVE CIRCUIT COMPONENTS**4Hrs**

Resistor – Metal film resistor – Wire wound resistor – Composition resistor- Colour coding – Potentiometer – Precision type potentiometer – Multi turn potentiometer – Capacitor – Electrolytic capacitor – Ceramic capacitor – Mica capacitor – Paper capacitor.

UNIT-IV: SEMICONDUCTOR DEVICES**5Hrs**

Basic concepts of P-N diode – Zener diode – Bipolar junction transistor – Junction field effect transistor – MOSFET – Thyristor – Photo devices.

UNIT-V: INTEGRATED CIRCUITS**5Hrs**

Fabrication of monolithic integrated circuits – Operational amplifier – Ideal operational amplifier characteristics – Inverting and non inverting amplifiers – Introduction to logic gates (AND, OR, NOT, EXOR, NAND and NOR).

UNIT-VI: LATEST LEARNING**2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. Basic electrical, electronics and computer engineering. Nagarajan. G Meenakshi publication, 1993.

2. Principles of Electronics. V.K. Mehta and Rohit Mehta. S. Chand & Company Limited, XI Edition (2008).

COURSE OUTCOME:

On completion of this course, the students will have

- ❖ the basic algebraic and arithmetic manipulating necessary in the analysis of electronic circuit.
- ❖ construct, analyze and trouble shoot simple circuits
- ❖ to operate Electronic test Equipments.
- ❖ Practice safe operating procedures
- ❖ understand the current voltage characteristics of semiconductor.

INTER DISCIPLINAR COURSE – II BASICS OF DIGITAL ELECTRONICS		
Course Code :		Max. Marks : 100
Hours/Week : 2		Internal Marks : 25
Credit : 2		External Marks : 75

OBJECTIVES:

- ❖ To understand the number systems and logic gates.
- ❖ To simplification of Boolean algebra.
- ❖ To study the sequential and combinational circuits digital.
- ❖ To learn basic concepts of memories.
- ❖ To learn latest design circuits

UNIT-I: BASICS AND NUMBER SYSTEMS**4Hrs**

Digital signals – Basic digital circuits – NAND, NOR, EX-OR – Universality of NAND and NOR gates – Number systems – Interconversion.

UNIT-II: COMBINATIONAL LOGIC DESIGN**4Hrs**

Boolean algebra – Demorgan's theorem – Karnaugh map (2-variables) – Don't care condition – Multiplexing – De-multiplexing.

UNIT-III: FLIP FLOPS**5Hrs**

RS flip flop – JK flip flop – D flip flop – T flip flop – Master slave flip flop – Applications

UNIT-IV: SHIFT REGISTERS AND COUNTERS**5Hrs**

Registers – Left shift – Right shift – Parallel in-Parallel out. Counters – Ripple counter – Twisted ring counter (Johnson's counter)

UNIT-V: MEMORIES

RAM Static, Dynamic – Diode RAM – PROM – EPROM

4Hrs**UNIT-VI: LATEST LEARNING****2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. Principles of Digital Electronics. Dr. K. Meena. Prentice Hall India P.V.T. Ltd. New Delhi (2009)

BOOK FOR REFERENCE:

1. Modern Digital Electronics, R.P. Jain. Tata Mcgraw Hill. 1997.
2. Digital Electronics. V.K. Puri. Tata Mcgraw Hill. 2017
3. Computer System Architecture, Morris Mano. Prentice Hall. 1998.

COURSE OUTCOME:

On completion of this course, the students have

- ❖ explain basic circuit and responses.
- ❖ understand linear modeling of passive elements and sources
- ❖ evaluate of different circuits.
- ❖ tuse analytical techniques in resistive circuits.
- ❖ design digital citcuits

INTER DISCIPLINAR COURSE – III PHYSICS FOR HOMEAPPLIANCES		
Course Code :		Max. Marks : 100
Hours/Week : 2		Internal Marks : 25
Credit : 2		External Marks : 75

OBJECTIVES:

- ❖ To understand the basic concepts of home appliances
- ❖ To learn the Physical principles and working mechanism of Home appliances
- ❖ To study the electrical MixerHours
- ❖ To study the different types Electric Geyser.
- ❖ To understand thedifferent types of Washing Machine

UNIT–I: ELECTRICAL IRON HOURS**4Hrs**

ElectricIron:CommonElectricpress–PartsofaCommonElectricPress-Testing andFaultFindingofan ElectricPress-Automaticpress–CircuitDiagram-Thermostat-Working ofaThermostat-Steampress.

UNIT–II: ELECTRICSTOVEANDELECTRIC KETTLE HOURS**5Hrs**

ElectricalStove-Description-HeaterElement-Ratings (Wire size,length,resistance, current,wattageetc) ofaHeaterElement-ElectricKettle-HeaterElements ofanElectric kettle-FaultFindingand Precautions.

UNIT–III: ELECTRICAL MIXERHOURS**5Hrs**

ElectricMixer:Parts ofanelectricalmixer–Attachments–Blender–Grinder–Juicer– Citrus press –BladesforCitrus press.

UNIT–IV WATER IMMERSIONHEATERANDELECTRICGEYSER**4Hrs**

WaterImmersionHeater–CommonFaults and Precautions - Electric Geyser:Types – Nonpressure type–Pressure type–FaultFindingandPrecautions.

UNIT–V: WASHINGMACHINES HOURS**4Hrs**

Washingmachine:Typesofwashingmachines –Conventional–Semiautomatic– Automatic– Precautionandfaultfindings.

UNIT-VI: LATEST LEARNING**2Hrs**

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKFORSTUDY:

1. S.K. Gupta,Service Manual-ElectricalHomeAppliances,GTPublications.2015.Mi
2. A.L. Anwani and I. Anwani, Basic Electrical Engineering, DhanpatRai and Co (P) Ltd., Delhi, 2003.

3. Troubleshooting and Repairing Major Appliances, Third Edition 2013 McGraw-Hill Education
4. Handbook of Repair and Maintenance Of Domestic Electronics Appliances handbook Shashi Bhushan Sinha 1 Jan 2016

BOOKS FOR REFERENCE:

1. William D. Cooper, Electrical Instruments and Measurement Techniques, PHI Pvt Co., New Delhi, 1997
2. S.P. Bali, Consumer Electronics, Pearson Education, India, 2005.
3. B.L. Theraja, Textbook of Electrical Technology, Vol.1&2, S.Chand, 2005.

COURSE OUTCOME:

On completion of the course, the students will have

- ❖ understand the basic ideas behind electrical appliances and their applications.
- ❖ understand the basic ideas behind electrical circuit diagram.
- ❖ study the concepts of heat elements and iron box
- ❖ acquired the ideas of working of Geyser.
- ❖ apply knowledge to servicing home appliances.

SEM – III: ALLIED COURSE – I: ALLIED PHYSICS – I		
Course Code :		Max. Marks : 100
Hours/Week : 4		Internal Marks : 25
Credit : 3		External Marks : 75

OBJECTIVES:

- ❖ To understand the centre of Gravity and stability of floating bodies.
- ❖ To understand the concepts of acoustics and properties of sound waves
- ❖ To learn the basic concepts of osmosis and diffusion
- ❖ To study the concepts of heat, spectroscopy and fibre optics

UNIT-I: MECHANICS**15-Hours**

Centre of Gravity – Centre of Gravity of a solid hemisphere – hollow hemisphere and Solid Cone. Stability of Floating bodies: Metacentre – Determination of a Metacentric height of a Ship.

UNIT-II: SOUND

Simple Harmonic Motion – Composition of two simple harmonic motion (1) along a straight line and (2) at right angles to each other – Lissajous figures and their applications. Acoustics of buildings Reverberation - Reverberation time – Sabine's formula conditions for good acoustics. Decibel – Phon – Intensity measurement by hot wire microphone method.

UNIT-III: PROPERTIES OF MATTER

Diffusion: Fick's Law – Coefficient of diffusion – Experimental Determination of Coefficient of Diffusion – Application. Osmosis: Laws of osmotic pressure – Berkeley and Hartley Method of determining Osmotic pressure – Elevation of Boiling point and depression of Freezing point – Application.

UNIT-IV: THERMAL PHYSICS

Newton's law of cooling – Verification – Specific Heat Capacity of a liquid by Cooling – Bomb Calorimeter. Conduction: Coefficient of thermal conductivity – Good and bad Conductor Stefan's law of radiation – Solar Constant – Angstrom's Pyroheliometer – Temperature of the Sun.

UNIT-V: OPTICS

Electromagnetic Spectrum – Spectral response of human eye – UV and IR spectroscopy – Raman Effect – Experimental Arrangement – Application of Raman Effect. Fiber Optic communication: Introduction – Optic Fiber – Numerical Aperture – Coherent bundle – Fiber optic communication System and its advantage – multimode fibre optic sensors.

UNIT-VI: LATEST LEARNING

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. Statics, Hydrostatics and Hydrodynamics Narayanamoorthy and Nagarathinam.

2. Sound–Saigal –S.Chand&Co. Delhi.
3. Properties of matter–D.S.Mathur.
4. Heat and Thermodynamics–Brijlal and Subramaniam
5. Optics–Brijlal and Subramaniam
6. Optics–Ajoy Ghatak –Tata McGraw Hill, Delhi.
7. Allied Physics–I–A.Sundaravelsamy.

COURSE OUTCOME:

On completion of this course the students

- ❖ Students completing this course shall be proficient with basic concepts in elastic properties of materials and importance of elasticity in beams and girders.
- ❖ Study of viscous properties of fluids provides knowledge in industrial product development (dyes, paints, food products).
- ❖ Acquires the ideas of applications of ultrasonic waves in diverse fields.
- ❖ Acquire the basic knowledge of optics and optical fiber communication

SEM – III: ALLIED COURSE – I: ALLIED PHYSICS – II (ANY 15 EXPERIMENTS ONLY)		
Course Code :		Max. Marks : 100
Hours/Week : 4		Internal Marks : 25
Credit : 3		External Marks : 75

Objective:

To motivate and educate the students to acquire skill in physics Experiments.

1. Non uniform bending – Pin and Microscope Method
2. Surface Tension and Interfacial Tension – Drop Weight Method
3. Coefficient of Viscosity of Liquid using graduated burette.
4. Specific heat capacity of liquid by Cooling Method.
5. Lee's Disc – Thermal Conductivity of Bad Conductor.
6. Spectrometer – Grating – Normal incidence method.
7. Spectrometer – Refractive index of Solid Prism (A, D and μ)
8. Newton's Rings – Radius of curvature of a convex lens
9. Sonometer – Verification of Three laws.
10. Carey Foster's Bridge – Specific Resistance.
11. Meter Bridge – Verification of Resistance in Series and Parallel.
12. EMF of thermocouple – Direct Deflection method
13. Characteristics of a junction diode
14. Construction of a full wave rectifier.
15. AND, OR and NOT logic gates – verification of truth table using Discrete components.
16. Meter Bridge – Determination of Specific Resistance.

REFERENCE BOOKS:

1. A text book of practical Physics – M.N. Srinivasan and others – Sultan Chand & Sons, New Delhi.
2. Practical Physics, S. Somasundaram, V. Balachandran, S. Padmanathan, Apsara Publications, Tiruchirapalli.
3. Practical Physics – A. Dhana Lakshmi and K.R. Paramasivam – Apsara Publication, Tiruchirapalli.

COURSE OUTCOME:

On completion of this course the students

- ❖ Be able to understand the concepts of mechanics, properties of matter and sound through different experiments.
- ❖ Acquire the basic trouble shooting skills and appreciate physics concepts through experiments.

SEM – III: ALLIED COURSE – I: ALLIED PHYSICS – III		
Course Code :		Max. Marks : 100
Hours/Week : 4		Internal Marks : 25
Credit : 3		External Marks : 75

OBJECTIVES:

- ❖ To study the static characteristics of electric charges
- ❖ To understand the atomic behavior of electric and magnetic field
- ❖ To understand the basic concepts of nuclear physics
- ❖ To understand the electronics and digital electronics

UNIT-I: ELECTROSTATICS

Coulomb's Law – Gauss Theorem and its application – intensity due to charged sphere and cylinder. Capacitors – Principles of a Capacitor – Capacity of a capacitor – Capacity of an isolated sphere and cylinder – Energy of a charged capacitor – Sharing of charges and loss of energy.

UNIT-II: ELECTRICITY

Kirchhoff's Law and their application to Wheatstone's network – Condition for bridge balance – Carey Foster's bridge – Variation of resistance with temperature – Laws of electromagnetic Induction – Expression for induced EMF – Co-efficient of coupling – Determination of co-efficient of self inductance by Rayleigh's Method – Eddy Current and its applications.

UNIT-III: ATOMIC PHYSICS

Atom models – Sommerfeld's and Vector atom models – Pauli's exclusion Principle – various quantum numbers and quantization of orbits. X-rays – Continuous and Characteristic X-rays – Mosley's Law and its importance – Bragg's Law – Miller indices – Determination of Crystal Structure by Laue's Powder photograph method.

UNIT-IV: NUCLEAR PHYSICS

Nucleus – Nuclear Size – Charge – Mass and Spin – Liquid drop and shell models. Nuclear Radiations and their properties – Particle Detectors: Cloud Chamber and Bubble Chambers. Four types of reactions – Elementary particles and their classifications.

UNIT-V: DIGITAL ELECTRONICS

Number systems – Decimal – Binary – Octal and HexaDecimal number systems and their Mutual Conversions – 1's and 2's complement of a Binary number and Binary arithmetic (Addition, Subtraction, Multiplication and Division) – Binary Subtraction by 1's and 2's complement methods – Basic logic gates – AND, OR, NOT, NOR, NAND and EXOR Gates – NAND and NOR as universal building gates – Boolean Algebra – Laws of Boolean Algebra – De Morgan's Theorems – Their verifications using truth tables.

UNIT-VI: LATEST LEARNING

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. Magnetism and Electricity – Khare and Srivastava – Atma Ram and Sons – New Delhi.
2. Modern Physics – Murughesan – S. Chand and Co.
3. Digital Principles and their applications – Malvino and Leach – Tata McGraw Hill.
4. Handbook of Electronics – Gupta and Kumar – Pragati Prakasan.
5. Allied Physics – II – A. Sundaravelsamy.

COURSE OUTCOME:

On completion of this course the students

- ❖ Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.
- ❖ Apply Gauss's law of electrostatics to solve a variety of problems.
- ❖ Have an ability to determine and describe static and dynamic electric and magnetic fields.
- ❖ Atomic physics studies about the atoms which isolates the system of electrons and an atomic nucleus.
- ❖ Understand the structure of various number system and basic logic gates.

SEM – III: ALLIED APPLIED PHYSICS – I		
Course Code :		Max. Marks : 100
Hours/Week : 6		Internal Marks : 25
Credit : 3		External Marks : 75

OBJECTIVES:

- ❖ To study the static characteristics of electric charges,
- ❖ To understand the concepts of capacitors and applications.
- ❖ To understand the electromagnetic effect
- ❖ To understand the AC circuits
- ❖ To understand the concept of magnetic properties of materials

UNIT-I: ELECTROSTATICS**15-Hours**

Coulomb's law- Gauss theorem and its application- Intensity due to a charged sphere- Intensity at a point due to a uniformly charged cylinder- Principles of a capacitor- Capacity of Spherical and cylindrical capacitors- Energy stored in a capacitor- Energy loss due to sharing of charges.

UNIT-II: MAGNETOSTATICS**15-Hours**

Intensity of magnetization- Susceptibility- Types of magnetic materials- Properties of paramagnetic and ferro magnetic materials- Cycle of magnetization- Hysteresis- B-H curve- application of B-H curve- Magnetic energy per unit volume.

UNIT-III: CURRENT ELECTRICITY**15-Hours**

Kirchoff's Law- Wheatstone network- Carey Foster's Bridge- Potentiometer- Measurement of current, resistance and low voltage- Theory of Ballistic Galvanometer- Figure of merit- Damping Correction.

UNIT-IV: ELECTROMAGNETIC INDUCTION**15-Hours**

Laws of electromagnetic induction- Relation between induced E.M.F and mutual inductance – Eddy Current – Determination of self inductance by Anderson method – Coefficient of mutual inductance – Determination of mutual inductance by B.G. – coefficient of coupling – transformer theory.

UNIT-V: ALTERNATING CURRENT**15-Hours**

AC Circuits with single components- Double components- Measurement of current and voltage- Power in an AC circuit- Power factor derivation- Wattless current- Choke-series and parallel resonance circuits- Impedance – Q factor- Selectivity and Sharpness of resonance

UNIT-VI: LATEST LEARNING

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. Brijlal and Subramaniam- Electricity and Magnetism- S.Chand & Co.-2000.
2. R. Murugesan, Electricity and Magnetism, S.Chand & Co.-2015.

3. A.Sundaravelusamy _Applied physicsI- _priya publications-2018.

BOOKS FORREFERENCE:

3. D.L sehgal,K.L.choproa and N.K sehal, Electricityand Magnetism– S.Chand&Co.- 1996

COURSE OUT COME:

On completion of this course,the students will be able to

- ❖ Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.
- ❖ Apply Gauss's law of electrostatics to solve a variety of problems.
- ❖ Apply the Kirchoff's law to analyse the wheatstone bridge.
- ❖ Have an ability to determine and describe static and dynamic electric and magnetic fields .
- ❖ Acquired the knowledge of magnetic materials.

SEM – IV: ALLIED APPLIED PHYSICS PRACTICAL - II (ANY 14 EXPERIMENTS ONLY)		
Course Code :		Max. Marks : 100
Hours/Week : 3		Internal Marks : 40
Credit : 3		External Marks : 60

Objective:

To motivate and educate the students to acquire skill in physics Experiments.

1. Semi conductor diode–Characteristics
2. Zener Diode–Characteristics
3. FET–Characteristics
4. Transistor Characteristics–CE configuration
5. Transistor Characteristics–CB configuration
6. Bridge Rectifier
7. Zener controlled regulated power supply
8. Field along the axis of a coil–M
9. Field along the axis of a coil–H
10. Potentiometer- Measurement of current
11. Potentiometer– Calibration of low range voltmeter
12. Carey Foster's bridge–specific resistance
13. Series resonance circuit
14. Mathematical operators–Addition, Subtraction using op-amp
15. AND, OR and NOT logic gates–verification of truth table using Discrete components.

REFERENCE BOOKS:

1. A text book of practical Physics–M.N.Srinivasan and others–Sultan Chand & Sons, New Delhi.
2. Practical Physics, S. Somasundaram, V. Balachandran, S. Padmanathan, Apsara Publications, Tiruchirapalli.
3. Practical Physics – A. Dhana Lakshmi and K.R. Paramasivam – Apsara Publication, Tiruchirapalli.

COURSE OUT COME:

On completion of this course, the students will be able to

- ❖ Be able to understand the concepts of mechanics, properties of matter and sound through different experiments.
- ❖ Acquire the basic trouble shooting skills and appreciate physics concepts through experiments.

SEM – IV: ALLIED APPLIED PHYSICS – III		
Course Code :		Max. Marks : 100
Hours/Week : 5		Internal Marks : 25
Credit : 3		External Marks : 75

OBJECTIVES:

- ❖ To understand the types of semiconductors
- ❖ To understand the characteristics of transistor and FET configuration.
- ❖ To study the basic concepts of MASER and LASER
- ❖ To study the Optoelectronic devices
- ❖ To understand the characteristics of operational amplifier and its applications

UNIT-I: SEMICONDUCTOR PHYSICS**15-Hours**

Intrinsic and extrinsic semiconductor – P and N type semiconductors – PN junction diode – V-I characteristics of junction diode – Zener diode – V-I Characteristics of Zener diode – Zener diode as the voltage regulator.

UNIT-II: TRANSISTORS**15-Hours**

PNP and NPN transistors DC Characteristics of CE and CB configuration – Hybrid parameters – Functions of Transistors as an amplifier – FET – V-I characteristics of FET – comparison between FET and BJT

UNIT-III: LASERS AND MASERS**15-Hours**

Basic concepts of stimulated emission – Population inversion and Metastable state – Ammonia maser – Ruby laser and HeNe laser production – Advantages

UNIT-IV: OPTOELECTRONIC DEVICES**15-Hours**

LED: Construction – V-I characteristics – LED – photodiode – Phototransistor – electronic watches – Seven segment displays – LCD – LASER Diode photo multiplier.

UNIT-V: OPERATIONAL AMPLIFIERS**15-Hours**

The basic operational amplifier – Inverting and Non-inverting operational amplifier – Differential Operational amplifier – CMRR – operational amplifier applications as inverter, summing amplifier, adder, subtractor, integrator and differentiator.

UNIT-VI: LATEST LEARNING

Latest development related to the course during the semester concerned (CIA purpose only, not for question setting)

BOOKS FOR STUDY:

1. Functional Electronics – Ramanan – TMH, 1994
2. A. Sundaravellusamy – Applied physics II – Priya publications – 2018.

BOOKS FOR REFERENCE

1. Metha V.K. principles of electronics s. chand and company Ltd.2015.
2. PulseandDigitalelectronics–G.KMithalandVanvasi–KhannaPublication–Delhi-2012.
3. ElectronicdevicesandCircuits–Millman&Halkias–TMH1991.

COURSE OUTCOMES:

On completion of this course,the students will be able to

- ❖ Acquire basic knowledge of p-n junction diode and Zener diode
- ❖ understanding Thevenin's theorem and procedure for finding Thevenin's equivalent circuit and to gain knowledge of Maximum Power theorem
- ❖ Acquiring the Knowledge of a different configuration, Biasing, h parameters and applications of FET and BJT.
- ❖ Acquire the basic knowledge of optoelectronics devices
- ❖ Undersand the types of LASER and MASER.