

Sri Ramakrishna College of Arts and Science (Autonomous)



(Affiliated to Bharathiar University)
(Re-Accredited with 'A' Grade by NAAC)
(An ISO 9001:2015 Certified Institution)



ava India, Coimbatore-641 006, Tamil Nadu, India.

"Scheme of Examination along with Distribution of Marks and Credits"

CBCS & OBE PATTERN UNDERGRADUATE PROGRAMMES

B.ScPhysics

(For the students admitted during the academic year 2019-2020 and onwards)

Part	Study Components and Course Title	CIA	Comprehensive Exam		Comprehensive Exam Total	Total	Credit
			Online	Descriptive Theory			
Semester - I							
I	Language-I-19T01- Tamil-1/19H01-Hindi-1/ 19F01-French-1/19M01- Malayalam-1/19A01-Arabic-1	30	-	70	70	100	3
II	19E01- English for Communication - I	30	-	70	70	100	3
III	19PH101-Core I – Properties of Matter & Acoustics	30	20	50	70	100	4
III	19PH102-Core II – Mechanics	30	20	50	70	100	4
III	19PH103- Allied-I Mathematics – I	30	20	50	70	100	4
III	19PH104- Practical –I General Experiments-I	30	-	-	70	100	3
IV	19VE01- Value Education #	100	-	-	-	100**	1#
IV	19PH105 –ECC- Spoken Tutorial – Introduction to Computers \$	-	-	-	-	-	1\$
IV	19CPE01–PACE – I @	-	-	-	100	100**	1@
IV	19PHJC1 – JOC - I	-	-	-	-	-	1\$

Semester-II

I	Language-II-19T02- Tamil-2/19H02-Hindi-2/ 19F02-French-2/19M02- Malayalam-2/19A02-Arabic-2	30	-	-	70	100	3
II	19E02- English for Communication - II	30	-	-	70	100	3
III	19PH201-Core III – Heat & Thermodynamics	30	20	50	70	100	4
III	19PH202-Core IV – Basic Electronics and Semiconductor Devices	30	20	50	70	100	4
III	19PH203- Allied-II Mathematics – II	30	20	50	70	100	4
III	19PH204- Practical –II General Experiments-II	30	-	-	70	100	3
IV	19ES01-Environmental Studies #	100	-	-	-	100**	1#
IV	19CPE02–PACE – II @	-	-	-	100	100**	1@
IV	19PHJC2 – JOC - II \$	-	-	-	-	-	1\$

Semester – III

III	19PH301- Core V – Optics	30	20	50	70	100	4
III	19PH302 – Core VI – Solid State Physics	Credit Transfer course from Swayam					
III	19PH303-Practical - III – General Experiments-III	30	-	-	70	100	3
III	OPEN ELECTIVES –I	30	20	50	70	100	3
III	19PH304- Allied-III-Allied Chemistry for Physics	30	20	50	70	100	3
III	19PH305- Allied Lab –I Allied Chemistry Lab for Physics	15	-	-	35	50	2
III	Skill based Subject: I 19PH306 – Digital Electronics and Applications	30	20	50	70	100	3
IV	19BCT01 / 19ACT01 Basic Tamil I / Adv. Tamil I #	100				100**	1\$
IV	19CPE03 PACE – III @	-	-	-	100	100**	1@
IV	19PHJC3 -JOC – III \$	-	-	-	-	-	1\$

Semester- IV

III	19PH401-Core VII – Electricity & Magnetism	30	20	50	70	100	4
III	Elective - I	30	20	50	70	100	4
III	19CSC08-Allied-IV Computer Programming in C	30	20	50	70	100	3
III	19PH402-Practical - IV – General Experiments-IV	30	-	-	70	100	3
III	19PH403 – Practical – V General Electronics Lab	15	-	-	35	50	2
III	Allied Lab-II 19PH404- C Programming Lab	15	-	-	35	50	2
III	19PH405-Skill Based Subject II - Integrated Circuits& 8085 Microprocessor	30	20	50	70	100	3
IV	19BCT02 / 19ACT02 Basic Tamil II / Advanced Tamil II #	100	-	-	-	100**	1\$
IV	19CPE04-PACE – IV @	-	-	-	100	100**	2@
IV	19PHJC4 – JOC -IV \$	-	-	-	-	-	1\$

Semester V

III	19PH501-Core VIII – Classical Mechanics and Relativity	30	-	70	70	100	5
III	19PH502-Core IX – Atomic Physics and Spectroscopy	30	20	50	70	100	5
III	19PH503-Core X – Mathematical Physics	30	20	50	70	100	4
III	19PH504-Practical - VI – Advanced Experiments-I	30	-	-	70	100	3
III	OPEN ELECTIVES –II	30	20	50	70	100	3
III	19PH505-Skill Based Subject III - Bio Medical Instrumentation	30	20	50	70	100	3
IV	19PH506 –ECC - Physics for Higher studies(Self Study Paper) \$	-	-	-	-	-	2\$
IV	19CPE05-PACE – V @	-	-	-	100	100**	2@
IV	19PHJC5 – JOC -V \$	-	-	-	-	-	1\$

Semester VI

III	19PH601-Core XI – Nuclear & Particle Physics	30	20	50	70	100	5
III	19PH602-Core XII – Quantum Mechanics	30	20	50	70	100	5
III	19PH603-Core XIII – Nano materials & Nano Technology	15	10	25	35	50	2
III	Elective –II	30	20	50	70	100	4
III	19PH604-Practical - VII – Advanced Experiments-II	30	-	-	70	100	3
III	19PH605-Skill Based Subject IV - Project & Viva voce	80	-	-	20	100	3
V	Extension Activities 19NS01-NSS/ 19NC01-NCC/ 19SP01-SPORTS/ 19YR01- YRC/19YH01-YOGA/19SB01- SBA/ 19SI01-SIS #	100	-	-	-	100**	1

\$ Extra credit courses for the candidates who opted other languages in Part – I, JOC, ECC.

No Comprehensive Examinations. Only Continuous Internal Assessment (CIA)

@ No Continuous Internal Assessment (CIA). Only Comprehensive Examinations.

** Marks will not be included in CGPA calculations.

List of Elective papers (Can choose any one of the paper as electives)		
Elective – I	19PHE01	Energy Physics
	19PHE02	Material Science
	19PHE03	Thermal physics
Elective – II	19PHE04	Astro Physics
	19PHE05	Laser Physics
	19PHE06	Principles of communication system

List of Open Elective papers offered by the dept.	
19PHIO1	Utilization of Solarenergy
19PHIO2	Physics in Daily Life.

Summary							
Part	Subject	Papers	Credit	Total credits	Papers	marks	Total marks
Part I	Languages	2	3	6	2	100	200
Part II	English	2	3	6	2	100	200
Part III	Core	13T+7P	54T+20P	92	20	1900	2400
	Allied	4T+2P	14T+4P		6	500	
	OPEN ELECTIVES	2	3	6	2	100	200
	Electives	2	4	8	2	100	200
	Skill Based	4	3	12	4	100	400
							3600
Part IV	Lang.	2	1	2\$	2	100	200**
	PACE	3	1	3@	5	100	500**
		2	2	4@			
	EVS & VE	2	1	2#	2	100	200**
	JOC	5	1	5\$	-	-	-
	Self Study	2	1 & 2	3\$	2	50	100**
Part V	@ Extension	1	1	1@	1	100	100**
	Total			140			

\$ - Extra credit courses

** - NOT INCLUDED IN TOTAL MARKS

Note: Total credits 140 + 10 ECC


Syllabus Coordinator


BOS-Chairman



19PH101– PROPERTIES OF MATTER & ACOUSTICS

Semester	I
Credit	4
Paper Type	Core
Max. Marks	CIA:30 CE :70

COURSEOBJECTIVES:

- To understand the different properties of solids and liquids
- To know about sound signal, ultrasonic and the factors affecting acoustics

UNIT – 1 ELASTICITY

11

Load, Stress & Strain, Hooke's law, Types of Elasticity – Young's modulus, Bulk modulus, Rigidity modulus – Poisson's Ratio – Torsion – Determination of Rigidity modulus (Static torsion method, dynamic torsion method). **Bending of Beams:** Expression for the bending moment – Cantilever – Measurement of Young's Modulus (E) – Non-uniform bending and uniform bending of a beam – Koenig's method.

UNIT – 2 VISCOSITY

10

Streamline motion – Turbulent motion – Poiseuille's formula – Terminal velocity and Stokes formula – Stokes method for the Coefficient of Viscosity of a viscous liquid – Searle's Viscometer – Rotating cylinder method of finding Coefficient of Viscosity (η).

UNIT – 3 SURFACE TENSION

11

Dimension of surface tension–Pressure difference across a liquid surface – Excess pressure inside a curved liquid surface – Determination of surface tension by Jaeger's method, Quincke's method, Rayleigh's method – Variation of Surface Tension with temperature – Drop weight method of determining the Surface Tension of a liquid – Vapour pressure over flat and curved surface.

UNIT – 4 GRAVITATION

9

Newton's law of Gravitation – Mass and Density of Earth – Kepler's law of planetary motion – Determination of G – Boy's Experiment – Gravitational field – Gravitational potential – Variation of 'g' with Latitude, Altitude and Depth.

UNIT – 5 SOUND & ACOUSTICS

14

Sound: Origin of Sound – Material medium is a necessity – Velocity of Longitudinal waves in Gases – Newton's formula for velocity of Sound – Effect of Temperature, Pressure, Density of the medium, Humidity and Wind – Velocity of sound in water, air and in isotropic solids. Velocity of transverse waves along a stretched string – Laws and verification of the transverse vibration of strings – Melde's experiment. **Acoustics:** Reverberation and Reverberation time – Sabine's formula – Absorption coefficient and its determination – Factors affecting the acoustics of building and their Remedies. **Ultrasonics:** Properties, Production – Magnetostriction method and piezoelectric method – Applications of Ultrasonic –Acoustics Grating.

COURSEOUTCOME:

After the successful completion of the course, the students will be able to

- Analyze the strength of the different solid material through elasticity
- Differentiate streamlined and turbulent motion of liquids.
- Determine the surface tension and viscosity between the liquids.
- Understand the gravitational field, gravitational potential and Acceleration due to gravity.
- Discuss the properties of ultrasonic and factors affecting the acoustics of building.

Total Periods: 55**TEXTBOOKS:**

1. R. Murugesan, "Properties of Matter" – S. Chand & Company Ltd, New Delhi, 5th Edition 2017 (Unit 1–4).
2. N. Subrahmanyam and Brij Lal "A Text Book of Sound" – Vikas Publishing House Pvt Ltd 2nd Revised Edition (Unit 5).

REFERENCEBOOKS:

1. D.S. Mathur, "Elements of Properties of Matter" – S. Chand & Company Ltd, 2014.
2. Brijlal and Subramaniam, "Properties of Matter" – S. Chand & Company, 2003.
3. Abraham I. Beltzer, "Acoustics of Solids" – Springer, 2011.

Verified by
Mr. M. Gowtham

Verified by BOS Chairman
Dr. S. Poonguzhalli

19PH102- MECHANICS

COURSE OBJECTIVES:

- To understand the Properties of rigid bodies, Motion of charged particles and concept of microscopic and macroscopic systems.
- To discuss the concepts of Simple Harmonic oscillations (SHO) and determine the center of pressure of liquids base on Hydrostatics.

Semester	I
Credit	4
Paper Type	Core
Max. Marks	CIA:30 CE :70

UNIT – I SYSTEM OF PARTICLES & DYNAMICS OF RIGID BODIES

11

Introduction – Dynamics of a system of particles and concept of rigid bodies – Centre of mass co-ordinates – Centre of mass of rigid body – Motion of center of mass and linear momentum – Collision – Elastic collision and Inelastic collision. Theorem of perpendicular axes, Parallel axes – Moment of inertia of a thin uniform bar, Rectangular lamina, Ring, Circular disc, Solid sphere, Hollow sphere – Routh's rule.

UNIT – II MOTION OF CHARGED PARTICLES IN ELECTRIC AND MAGNETIC FIELD

12

Motion of a charged particle in uniform electric field – Longitudinal acceleration – Transverse acceleration – Cathode ray oscillography – Application of cathode ray oscillography – Charged particle in an alternating electric field – Linear accelerator – Motion of charged particle in uniform magnetic field – Cyclotron frequency – Effect of simultaneous electric field and magnetic fields (Lorentz Force).

UNIT – III OSCILLATORS

10

Linear harmonic oscillator – Energy of a simple harmonic oscillator – Simple harmonic oscillations of a loaded spring – Simple pendulum – Compound pendulum – Bar pendulum – Helmholtz resonator – Oscillations of two masses connected by a spring – Lissajous' figures.

UNIT – IV STATISTICAL MECHANICS

10

Microscopic and Macroscopic systems – Calculation of probabilities – Phase trajectory – Statistics of an assembly of particle – Phase space and density of states – Distribution function – Maxwell-Boltzmann Statistics of a system of particle – Equipartition of energy – Average speed, root-mean square speed, and most probable speed – Fermi-Dirac statistics – Determination of Fermi level – Some feature of the Fermi-Dirac statistics – Bose-Einstein statistics – Comparison of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac system.

UNIT – V HYDROSTATICS

12

Definition and determination of center of pressure – Expression for center of pressure of a rectangular lamina with one side on the surface of the liquid – Expression for center of pressure of a triangular lamina in the case of, (i) Vertex on the surface of the liquid and (ii) Base on the surface of the liquid – Laws of floatation – Definition of metacenter and metacentric height – Determination of metacentric height of a ship.

COURSE OUTCOME:

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

- Recognize the linear and angular momentum of system of particle.
- Explain the motion of charged particles in electric and magnetic fields
- Understand the concept of simple and compound pendulum.
- Explain the concept of Simple Harmonic Oscillation
- Calculate the center of pressure of the liquid for various natures.

Total Periods: 55

TEXT BOOK:

- Brijlal N. Subrahmanyam, Jivan Seshan, "Mechanics & Electrodynamics"– S. Chand & Company, 2011 (Unit I, II & III).
- Dr. D. Chattopadhyay and Dr. P. C. Rakshit, "Quantum Mechanics, Statistical Mechanics and Solid state Physics" – S. Chand, 9th Edition, 2010 (Unit-IV).
- R. Murugesan, "Mechanics and Mathematical Physics" – S. Chand & Company, 2015 (Unit-V).

REFERENCE BOOKS:

- D.S. Mathur, "Mechanics" – S. Chand & Company, Revised Edition 2012.
- White, "Fluid Mechanics in SI Units" – Mc Graw Hill India, 2017.

Verified by Course Coordinator
Mr. M. Gowtham

Verified by BOS Chairman
Dr. S. Poonguzhali

19PH103 – Allied - I Mathematics - I**COURSE OBJECTIVE**

1. To provide the basic knowledge of Sequences and Series and Nature of roots of theory of equations.
2. To provide the basic knowledge of Trigonometry and Matrices.
3. To give basic knowledge about Mathematical concepts in Calculus.

Semester	I
Credit	4
Paper Type	Allied
Max. Marks	CIA -30 CE -70 TOTAL =100

UNIT-I**(11)**

ALGEBRA: Statement of Binomial, Exponential and Logarithmic series –Approximation and limit expression obtained by Binomial, Exponential and Logarithmic series. **Chapter 1: Section: 1.2, 1.3, 1.4** (Omit summation problems from all section).

UNIT-II**(11)**

MATRICES: Rank of a matrix – Simultaneous linear equations - Eigen values and Eigen vectors - Cayley-Hamilton Theorem (without proof) and its applications. **Chapter 3: Section: 3.2 – 3.5.**

UNIT III**(11)**

FINITE DIFFERENCES: Interpolation - Binomial method –Lagrange's interpolation. **Chapter 4: Section: 4.1 –4.3. (Omit exercises)**

UNIT IV**(11)**

TRIGONOMETRY: Expansions of $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$ – Expansion of $\sin \theta$ and $\cos \theta$ in a series of ascending powers of θ - Hyperbolic functions - Relation between Hyperbolic functions - Inverse Hyperbolic functions – Real and Imaginary parts - Logarithm of complex numbers. **Chapter 5: Sections 5.1, 5.3 to 5.5.**

UNIT V**(11)**

DIFFERENTIAL CALCULUS: Curvature – Circle, radius and centre of curvature - Coordinates of centre of Curvature –Evolute and involute –Radius of Curvature in polar coordinates - p-r equation of the curve. **Chapter 6: Section: 6.4.**

TOTAL PERIODS: 55**COURSE OUTCOMES**

Having successfully completed this course, the student will be able to:

CO1	Defining hyperbolic and inverse hyperbolic functions.
CO2	Understanding the concept of Characteristic equations to find Eigen Values and Eigen Vector.
CO3	Applying finite difference methods for interpolation.
CO4	Gaining the knowledge about Trigonometry.
CO5	Derive the formula for radius of curvature.

* Note: The Question paper consists 20% Theory and 80% Problems.

TEXT BOOK

1. Ancillary Mathematics (Volume I) by S. Narayanan, R. Hanumantha Rao, Manickavachagam Pillai and P. Kandaswamy, S.Viswanathan (Printers & Publishers) Pvt Ltd., 2007.

REFERENCE BOOKS

1. G.C.Sharma and Madhu Jain, Algebra and Trigonometry, 1st Edition, Galgotia Publications Pvt.Ltd., 2003.
2. Dr.J.K.Goyal and G.P.Gupta, Laplace and Fourier Transforms, 16th Edition, Pragati Prakashan, Meerut, 2003.

Prepared by
Dr. D. VIVEK

Approved by
Dr. N. MUTHUMANI

19PH104 – PRACTICAL I – GENERAL EXPERIMENTS –I

COURSE OBJECTIVE:

- To learn the concept of different properties of matter and the law of motion experimentally.

Semester	1
Credit	3
Paper Type	Practical
Max. Marks	CIA:30 CE :70

All the Experiments


- Young's modulus of the given bar – Uniform bending using Pin & Microscope
- Young's modulus of the given bar – Non Uniform bending using Pin & Microscope
- Young's Modulus – Cantilever using Pin & Microscope
- Rigidity modulus of the rod – Static torsion method
- Rigidity modulus of the wire and moment of inertia of the disc – Torsional Pendulum
- Surface tension of a liquid-drop weight method and viscosity of highly viscous liquid – Stokes method.
- Newton's law of cooling – Specific heat capacity of the unknown liquid.
- Compound Pendulum – Acceleration due to gravity and radius of gyration.

COURSE OUTCOME:

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

- Recognize the physical properties of matter by interpreting the results of experiment.
- Determine the gravity and radius of gyration using compound pendulum.
- Apply the mechanical properties of solids, liquids and fluids in real time applications.
- Develop team work skills through group wise experimentation.


 Verified by Course Coordinator
 Mr. M. Gowtham


 Verified by BOS Chairman
 Dr. S. Poonguzhali

19PH201- HEAT AND THERMODYNAMICS

COURSE OBJECTIVE:

- To understand the importance of Kinetic Theory of gases, Concept and application of thermometry, heat transmission, radiation and the laws of thermodynamics.

Semester	II
Credit	4
Paper Type	Core
Max. Marks	CIA:30 CE :70

UNIT – 1 KINETIC THEORY OF GASES

Introduction – Degrees of freedom – Equipartition of energy – Atomicity of gases – Maxwell's law of distribution of molecular velocities – Expression for mean velocity, mean square velocity and the most probable velocity – Mean free path of a molecule – Expression for the mean free path – Transport phenomena(concept only) – Real or perfect gas (Van der Waals Equation).

11

UNIT – 2 THERMOMETRY

Concept of heat and temperature – Joule-Thomson Effect – Porous Plug Experiment – Thermometry – Types of Thermometers – Centigrade, Fahrenheit scales – Platinum Resistance Thermometer – Seebeck effect – Peltier effect – Thomson effect – Low temperature measurement – High temperature measurement – Joule's calorimeter.

11

UNIT – 3 RADIATION

Thermal Radiation – Prevost's Theory of Heat exchanges – Stefan-Boltzmann law – Wein's Displacement law – Rayleigh Jean's law – Planck's radiation law – Solar constant – Angstrom's Pyrheliometer – Sources of solar energy.

10

UNIT – 4 TRANSMISSION OF HEAT

Coefficient of Thermal conductivity – Periodic flow of heat – Thermal conductivity measurement (Angstrom's method) – Propagation of Heat waves in the earth's crust – Searle's method – Lee's method for metals – Wiedemann Franz law(statement) – practical application of conduction of heat – Davy's safety lamp – Convection – Application of convection – Thermo flask.

12

UNIT – 5 THERMODYNAMICS

Thermodynamic system – Thermodynamic variables and equation of state – Three classes of system - Zeroth law of Thermodynamics – Concept of Heat – First law of thermodynamics – Second law of thermodynamics – Carnot's Theorem – Concept of Entropy – Physical concept of Entropy – Change of Entropy in reversible cycle – Change of entropy in irreversible process – Third law of Thermodynamics.

11

COURSE OUTCOME:

After the successful completion of the course, the students will be able to

CO	Statement
CO1	Acquire the knowledge on Kinetic theory of gasses
CO2	Compare the different types of thermometers
CO3	Discuss the fundamental laws of radiation and Differentiate thermal conductivity measurement methods
CO4	Comprehend the concept of laws of thermodynamics and Carnot's theorem

Total Periods: 55

TEXT BOOK:

- R. Murugesan, Kiruthigasivaprasath, "Thermal Physics"-S.Chand Publishers- edition, 2010. (Unit-I)
- Brijlal Dr.N.Subrahmanyam,P.S.Hemne,"Heat Thermodynamics and statistical Physics – S.Chand Publishers – edition, 2010. (Unit- II to V)

REFERENCE BOOKS:

- D.S.Mathur, "Heat and Thermodynamics" – S.Chand Publishers, 3rd edition, 2004.
- A.B.Gupta & H.P.Rai,"Heat and Thermodynamics" – New Central book – 1st edition, 2010.
- K. D. Krori, "Advanced Heat and Thermodynamics"- New Central Book Agency, 2004.
- Mark Zemansky, Richard Dittman,"Heat and Thermodynamics"- McGraw Hill Education, 8th edition, 2017.
- William Z.Black, James G. Hartley, "Thermodynamics (SI Version)"- Pearson – 3rd edition.

Prepared by

Ms Dhivya R

Approved by

Dr Poonguzhali S

19PH202 – BASIC ELECTRONICS & SEMICONDUCTOR DEVICES

COURSE OBJECTIVE

- To make the students to learn the basics of Electronics and to study the characteristics and application of Semi conductor devices

Semester	II
Credit	4
Paper Type	Core
Max. Marks	CIA:30 CE :70

UNIT – 1 ELECTRICAL ELEMENTS & CIRCUITS

10

Potential – Potential Difference – Electric Current - Ohms Law – Kirchhoff's Law (Branch Current method) – DC Resistive circuits

UNIT – 2 NETWORK THEOREMS

11

Thevenin theorem – Norton's theorem – Thevenin – Nortons Conversions – Super position theorem – Millman's theorem – Maximum power transfer theorem – Star-Delta conversions.

UNIT – 3 AC CIRCUITS

11

AC Circuit with Resistance alone – Circuit with X_L alone – Circuit with X_C alone – Series reactance & resistance – Parallel reactance & resistance – Series resonance circuit – Parallel resonance Circuit

UNIT – 4 SEMI CONDUCTOR DEVICES

12

Diodes: Characteristics of PN junction diode, Zener Diode, Tunnel diode, Varactor diode, Schottky diode, Light emitting diode.

Transistors: Working – Types of transistor – Characteristics of CB, CE & CC configuration

FET & UJT: Characteristics of JFET, Characteristics of MOSFET (Enhancement mode), Characteristics of UJT & Application of UJT (Saw tooth Wave Generator)

UNIT – 5 APPLICATIONS OF SEMICONDUCTOR DEVICES

11

Rectifier : Half Wave rectifier – Full wave rectifier – Bridge rectifier.

Amplifier : RC coupled amplifier – Feedback amplifier – Class A and Class B amplifier.

Oscillators: Classification of Oscillators – Barkhausen Criterion – Hartley Oscillator – Colpitt's oscillator

COURSE OUTCOMES

After the successful completion of the course, the students will be able to

CO	Statement
CO1	Classify electrical circuits
CO2	Discuss the concept of Network theorems
CO3	Analyze the ac circuits with passive components
CO4	Differentiate the characteristics of semi conductor devices and explain its applications

TEXT BOOKS:

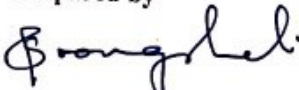
Total Periods: 55

- Bernard Grob, "Basic Electronics" Mc Graw Hill, 10th edition, 2008. (Unit I –III)
- R.S.Sedha, "A Text Book of Applied Electronics", S. Chand & Company Ltd, 1st edition, 2014. (Unit I, IV–V)

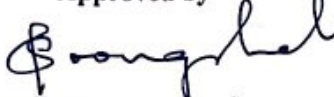
REFERENCE BOOK:

- V. K. Metha, "Principles of Electronics", S. Chand and Company Ltd, 2009.
- D. Neamen and D. Biswas, "Semiconductor Physics and Devices"- McGraw Hill, 4th edition, 2012.
- B. L. Theraja, "Basic Electronics - Solid State", S. Chand and Company Ltd, 2007.

Prepared by


Dr Poonguzhali S

Approved by


Dr Poonguzhali S



19PH203 -

Mathematics II

COURSE OBJECTIVE

1. To get the knowledge about the Fourier series and vector analysis.
2. To evaluate the Laplace and Inverse Laplace transforms.
3. To get the ability of solving Ordinary and Partial differential equations.

Semester	II
Paper Type	Allied
Credit	4
Max. Marks	CIA -30 CE -70 TOTAL =100

UNIT-I

ORDINARY DIFFERENTIAL EQUATIONS: Variable separable- Homogenous equations - Non- (11)
Homogenous equations - Linear equations - Bernoulli's equations - First order higher degree equations.
Chapter 4: Section: 1 - 5.

UNIT-II

PARTIAL DIFFERENTIAL EQUATIONS: Derivation of partial differential equations- Eliminations of (11)
arbitrary constants / functions -Different integrals of partial differential equations -Four standard types of
first order equations - Lagrange's equations.
Chapter 6: Section: 1 -3, 5, 6.

UNIT III

FOURIER SERIES: Fourier series -Even and Odd functions -Half range Fourier series (11)
-Development in cosine series -Development in sine series.
Chapter 2: Section: 1 -5.

UNIT IV

LAPLACE TRANSFORMS: Definition - Laplace transforms of standard functions -Inverse Laplace (11)
Transforms - Applications to solve ordinary differential equations and simultaneous equations.
Chapter 7.(Example problems only)

UNIT V

VECTOR ANALYSIS: Vector differentiation - Gradient of a scalar point function -Divergence and (11)
Curl -Formula connecting Divergence and Curl .Vector integration : Line integral.
Chapter 8: Sections: 16, 17, 18, 19, 21, 2.

TOTAL PERIODS: 55**COURSE OUTCOMES(Cos)**

Having successfully completed this course, the student will be able to:

CO1	Solve the ordinary differential equations.	L3
CO2	Solve the partial differential equations.	L3
CO3	Determine the Fourier coefficient of periodic functions.	L3
CO4	Apply the Laplace transform to solve the ordinary differential equations.	L3
CO5	Estimate the differential operator to find Gradient, Divergence and Curl.	L3

TEXT BOOK

1. Ancillary Mathematics (Volume II) by S. Narayanan, R. Hanumantha Rao, Manickavachagam Pillai and P. Kandaswamy, S.Viswanathan (Printers & Publishers) Pvt Ltd., 2007.

REFERENCE BOOKS

1. Shanti Narayan, Differential Calculus, Shyamlal Charitable Trust, New Delhi, 2004.
2. B.M.Aggarwal, Integral Calculus, 1st Edition, SatyaPrakashan Publishers, New Delhi, 1992.
3. P.N.Chatterji, Vector Calculus, 1st Edition, Rajhans Prakashan Publishers, Chennai, 1998

Prepared by
Ms. G. GOMATHI

Approved by
Dr. N. MUTHUMANI

Verified by
Academic Council-secretary

19PH204 – PRACTICAL – II – GENERAL EXPERIMENTS – II

COURSE OBJECTIVE

- To provide the basic experimental experiences of thermal properties and circuit applications of semiconductor devices.

Semester	II
Credit	3
Paper Type	Practical
Max. Marks	CIA:30 CE :70

LIST OF EXPERIMENTS

1. Thermal conductivity of bad conductor – Lee's Disc
2. Joule's Calorimeter – (Specific Heat Capacity of a given liquid)
3. Verification of Thevinin's theorem and Verification of Norton's theorem
4. Verification of Maximum Power transfer theorem and construction of Half wave rectifier using PN Junction Diode
5. Characteristics of Junction Diode and Zener Diode
6. CE characteristics – NPN Transistor
7. Determination of Band gap energy of a PN junction diode
8. Relaxation Oscillator – UJT

COURSE OUTCOMES

After the successful completion of the course, the students will be able to

CO	Statement
CO1	Recognize the thermal properties of substance by interpreting the results of the experiments
CO2	Design a circuit to verify network theorems and analyze the circuits by knowing the characteristics of electronic components
CO3	Develop team working skills through group experiments

Total Periods: 40

Prepared by

Ms Dhivya R

Approved by

Dr Poonguzhal S

PERSONALITY APTITUDE AND CAREER ENHANCEMENT (PACE-II)

Subject Code: 19CPE02

Common to all the UG streams admitted from AY 2019-20 Onwards

Semester	II
Credit	1
Paper type	Skill based
Max. Marks	Total=100 (Online:50+Verbal Oral: 50)

Instruction Hours per Semester: 40

Aim

To educate and enhance the students on English language, story building and article summarization. Equip the students on group discussion and public speaking skills.

Course Objectives

To enable students to,

- Enhance English Language and Listening Ability
- Enhance Non-Verbal Communication
- Improve their written communication through Story-Building, Article Summarization and Audio/Video Analysis.
- Enhance their group behavior and team building skills.
- Build resumes, speak in public, debate and discuss in groups

Unit I

English language enhancement- Business Idioms- Indianisms in English- Common Errors in Pronunciation - Signposts in English- Verbal ability- Phrases, clauses and modifiers - errors in tenses – prepositional errors – parallelism errors – mood, conditionals and multiple usages.

Unit II

English listening- hearing Vs. listening - Nonverbal communication – Appearance, dressing and grooming -Tips to maintain good impression at work - business etiquette – basic postures and gestures and table manners, Body language - dealing with people communication - media etiquette - telephone etiquette, email etiquette.

Unit III

Written Communication - Story Building; Article Summarization, Audio Analysis & Voice Recording; Article Summarization & Movie / Video Analysis;

Unit IV

Group discussion, interviews and presentation skills - Group behaviour – Team Work – Team building – Open and Closed group discussions. Public speaking skills – Social Phobia – Eliminating Fear - Organizing speech and effective delivery – Common etiquette of Public speaking - opening and closing of speech, audience management and styles.

Unit V

Exercises on Resume writing - Public speaking, Group discussion, debate, extempore, quiz and contemporary group play and role play.

Course Outcomes

On the successful completion of the course, the student would be able to-

- Enhance their English Language
- Understand and improve their body language.
- Write better through story-building, article summarization and audio/video analysis
- Improve their group behavior and team building skills.
- Prepare resumes, speak in public, debate and discuss in groups

References

1. Quantitative Aptitude for Competitive Exams by R. S. Agarwal
2. Quantum CAT by Sarvesh Verma
3. A Modern Approach to Logical Reasoning by R. S. Agarwal
4. Verbal Ability and Reading Comprehension by Arun Sharma
5. Word Power Made Easy by Norman Lewis
6. High School English Grammar by Wren and Martin
7. English Conversation Practice by Grant Taylor
8. Group Discussion and Interviews by Anand Gangly
9. Art of Social Media by Guy Kawasaki



**Verified by
Course Coordinator**

Sri Ramakrishna College of Arts and Science (Autonomous)
Coimbatore – 641006

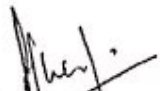
ENVIRONMENTAL STUDIES


*[A one Credit Course offered for First years
with effect from 2019-2020 Academic year and onwards]*

SCHEME OF EXAMINATION

1. Environmental Studies paper is a **ONE CREDIT** course.
2. The course will have only one Internal Examination (Model Examination for 3 hours) at the end of the semester.
3. The examination pattern is descriptive type written examination.
4. The course carries a total marks of 100 out of which 80 marks will be allocated for written examination and 20 marks will be assigned for activity.
5. The Passing minimum is 40 out of 100 marks.
6. The assessment will consist of two parts, as detailed below:

SN	Nature of Exam	Maximum Marks	Remarks
1.	Descriptive Examination	80 Marks (Section A: 10 x 4 = 40) (Section B: 5 x 8 = 40)	<ul style="list-style-type: none">• Centralized Examination• For 3 Hours Duration• Descriptive type questions• Model Examination only
2.	Activity	20 Marks	Activity (Visit to local areas/ Documentation/ Paper presentation/ Quiz/ Panel Discussion / Participation in seminar/workshop /Assignment / Seminar/ Model Design) Individual Report to be submitted to the Subject handling faculty
Total		100 Marks	


Course Coordinator


Member Secretary
Academic Council

19ES01 - ENVIRONMENTAL STUDIES

COURSE OBJECTIVES

- To recognize the major concepts of ecosystem and have in-depth understanding of environmental interactions and alternate energy resources.
- To understand the role of various environmental pollutants and its effects.
- To understand the environmental social issues and develop problem – solving skills using scientific techniques.
- To understand the Human Population growth and its variation in the environment.

Semester	II
Credit	1
Max. Marks	CIA - 100 TOT = 100

Unit I (4)
Multidisciplinary nature of environmental studies Definition, scope and importance, Need for public awareness, Introduction to Renewable and Nonrenewable sources – Uses of alternate energy sources.

Unit II (6)
Ecosystems - Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Food chains, food webs and ecological pyramids. Types of ecosystem - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity – Levels – Patterns – Threats – Biodiversity services.

Unit III (5)
Environmental Pollution – Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Solid waste Management : Causes, effects and control measures of urban and industrial wastes. Disaster management : floods, earthquake, cyclone and landslides.

Unit IV (6)
Social Issues and the Environment Urban problems related to energy, Water conservation, rain water harvesting and watershed management. Environmental Issues in Coimbatore District (Noyyal River, Dye Industries and Agricultural issues). Environmental ethics: Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents. Environment Protection Act - Wildlife Protection Act, Forest Conservation Act and Issues involved in enforcement of environmental legislation.

Unit V (5)
Human Population and the Environment - Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights-Women and Child Welfare, Role of Information Technology in Environment and human health.

***Activity – Documentation about Environmental Impacts/ Socio – Environmental Issues.**

Total Periods: 26

COURSE OUTCOMES

- Ability to describe the principles of ecology and major concepts in environmental sciences.
- Ability to interpret the key concepts in Environmental pollution that apply to air, land and water issues on a global scale and population growth.
- Ability to investigate the polluted environment area and document the risks and formulate a design for the environmental health.
- Ability to identify the Socio - Environmental issues and apply the related analysis for the protection of environment.
- Ability to distinguish the human rights, women and child welfare in the environment.




TEXT BOOK:

1. Erach Bharucha, "Textbook for Environmental Studies for Undergraduate Courses", 2nd edition, University Grants Commission, New Delhi and Bharati Vidyapeeth Institute of Environment Education and Research, Pune, University Press, 2013.

REFERENCES:

1. M P Poonia and S C Sharma, "Environmental Studies - Concepts, Impacts, Mitigation and Management", 2nd edition, Khanna Book Publishing, 2019.
2. R Rajagopalan, "Environmental Studies", 3rd edition, Oxford University Press, 2015.
3. Shashi Chawla "A Text Book of Environmental Studies", 1st edition, Tata McGraw Hill, 2012.



Verified and Approved by Course Coordinator
Dr D Jayasheela

Associate Professor, Department of Biotechnology
Sri Ramakrishna College of Arts and Science (Autonomous),
Coimbatore – 641006.



19PH301-OPTICS**COURSE OBJECTIVES**

- To understand the properties of light and to analyze the various phenomena associated with lights using basic principles.

Semester	III
Credit	4
Paper Type	Core
Max. Marks	CIA:30 CE :70

UNIT – 1 GEOMETRICAL OPTICS**11 hrs**

Introduction – Light – Properties of light: Reflection of light, Refraction of light – Refractive index – Optical path – Dispersion – Velocity of light – Visible range – Photons – Dual nature – Fermat's principle of least time – **Lenses:** Thin lens – Lens equation (Thin) – Thick lens – Behaviors of lens as thickness increases – Lens aberrations: Spherical aberrations – Reducing spherical aberrations – Coma – Astigmatism – Distortion.

UNIT – 2 INTERFERENCE**11 hrs**

Light waves – Superposition of waves – Interference– Theory of interference – Intensity distribution –Young's double slit experiment – Coherence – Conditions for interference – Techniques of obtaining interference – Interference in thin films – Wedge shaped film – Newton's rings – Michelson's Interferometer & it's application.

UNIT – 3 DIFFRACTION**10 hrs**

Huygens – Fresnel theory – Fresnel's assumptions – Rectilinear propagation of light – Zone plate – Action of zone plate – Difference between zone plate and convex lens – Distinction between interference and diffraction – Fraunhofer diffraction – Diffraction in single and double slit – Plane diffraction grating.

UNIT – 4 POLARIZATION**10 hrs**

Polarized and un-polarized light – Natural light – Types of polarization – Production of plane polarized light – Brewster's law & its application – Polarizer and Analyzer – Production & Detection of linearly polarized light – Malus' law – Calcite crystal – Huygens explanation of double refraction – Application of Polarized light.

UNIT – 5 LASERS AND FIBRE OPTICS**13 hrs**

Characteristics of laser – Interaction of light with matter – Einstein coefficients and their relations – Light amplification – Population inversion – Components of laser – Lasing action – Types of laser: He-Ne Laser (Gas laser), CO₂ laser (molecular gas), Semiconductor laser – Applications of laser. **Optical fibre:** Structure – Total internal reflection – Propagation of light through an optical fibre – Numerical aperture (NA) and Acceptance angle (θ_a) – Classification of fibers – Applications of optical fibres.

COURSE OUTCOME

After the successful completion of the course, the students will be able to,

CO	Statement
CO1	Explain the principles, properties and aberrations in the lenses.
CO2	Analyze the theory of interference and calculate the refractive index of lenses
CO3	Discuss the concept of Diffraction and Polarization.
CO4	Differentiate the types of laser.
CO5	Explain the working principles of optical fibre.

Total Periods: 55hrs**TEXT BOOK:**

- N. Subrahmanyam, Brij Lal, M.N. Avadhanalu "A Text Book of Optics" – S. Chand & Company Ltd, 25th Edition, (2015) (Unit 1–5).

REFERENCE BOOKS:

- R Murugesan, "Optics and Spectroscopy" – S. Chand & Company Ltd. 7th Edition, (2014).
- Ajoy K. Ghatak, "Modern Optics" – Tata Mc Graw-Hill Pub. Co.Ltd. Delhi, (2011).
- R Murugesan, "Modern Physics" – S.Chand & Company Ltd. 17th Edition, (2016).
- Francis Jenkins & Harvey White, "Fundamentals of Optics" – Mc Graw-Hill Education. 4th Edition (2017)

Prepared by
Ms.Dhivya R

Verified by
Dr. Poonguzhali S

Approved by
Academic Council-Secretary

19PH302-SOLID STATE PHYSICS

CREDIT TRANSFER COURSE



COURSE OBJECTIVES

- In this course students will learn the structure of solid materials and their different physical properties along with underlying physics.

COURSE LAYOUT

- Week 01: Atom to solid structure
- Week 02: Crystal symmetry, unit cells and crystal planes
- Week 03: Real space and reciprocal space of crystals
- Week 04: X-ray diffraction and determination of crystal structures
- Week 05: Thermal Properties of Solids
- Week 06: Free electron theory of solids
- Week 07: Band structure of solids
- Week 08: Semiconducting property of solids
- Week 09: Superconductivity
- Week 10: Diamagnetism and paramagnetism
- Week 11: Ferromagnetism and antiferromagnetism
- Week 12: Dielectrics and Ferroelectrics

Semester	III
Credit	4
Paper Type	Core
Max. Marks	Assignment – 25 Exam – 75

COURSE OUTCOME:

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

- Classify crystal structure and their properties
- Explain the characteristics of Bonding
- Analyze the classical free electron theory of solids
- Categorize the types semiconducting, dielectric & superconducting materials and their applications.

Text book:

- Charles Kittel, "Introduction to Solid State Physics", Wiley India Private Limited; 8th edition, 2012.
- Charles Kittel, "Elementary Solid State Physics", John Wiley & Sons; 1st Edition (1962).

Duration: 12 weeks
 Start Date: 20 Jul 2020
 End Date: 09 Oct 2020
 Exam Date: 18 Oct 2020
 Enrollment Ends: 27 Jul 2020

Prepared by

Ms. Sahana Fathima A

Verified by

Dr Poonguzhali S

Approved by

Academic Council-Secretary

19PH303- GENERAL EXPERIMENTS -III

COURSE OBJECTIVE:

- To Understand the Properties of Light and calibration of various meters practically.

Semester	III
Credit	3
Paper Type	Practical
Max. Marks	CIA -30 CE -70

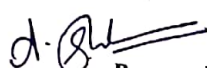
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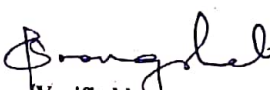
1. Spectrometer- Refractive index of a solid prism
2. Spectrometer- Refractive index of a liquid prism
3. Verification of Kirchoff's Law
4. Carey Foster's Bridge - Specific resistance of the coil
5. Radius of curvature of convex lens - Newton's ring
6. Spectrometer-Wavelength of prominent mercury spectral lines by normal incidence method using grating
7. Melde's string-Frequency of vibrator
8. Meter Bridge - Specific resistance of a given coil

COURSE OUTCOME:

After the completion of the course the students will be able to

CO	Statement
CO1	Calculate the optical properties of liquids and solids
CO2	Calibrate the voltmeter.
CO3	Find the wavelength of mercury spectrum.
CO4	Calculate the relative densities of solid and liquid.
CO5	Develop teamwork skills through group wise experimentation.


Prepared by
Ms. Sahana Fathima A


Verified by
Dr. Poonguzhali S


Approved by
Academic Council Secretary

19PH304 – ALLIED – III: ALLIED CHEMISTRY FOR PHYSICS**COURSE OBJECTIVES**

- To enable the student to understand the basic concepts in photochemistry.
- To know about the applications of UV-Visible and IR spectroscopy.
- To have an idea about the electrochemical cells and energy storage devices.
- To introduce the basics of nano chemistry and technology.

Semester	III
Credit	3
Paper Type	Allied
Max. Marks	CIA: 30 CE : 70 TOT: 100

UNIT – I PHOTOCHEMISTRY

9

Photochemical reaction – difference between photochemical and thermal reactions – laws of photochemistry – Grothus-Droper's law – Stark-Einstein law of photochemical equivalence – H_2/Br_2 reaction – quantum yield of photochemical reaction – photosensitized reaction – photo physical process – fluorescence, phosphorescence and chemiluminescence.

UNIT – II UV-VISIBLE SPECTROSCOPY

9

UV-visible spectroscopy – types of electronic transitions – Beer's-Lambert's law – definition – chromophores – auxochromes – bathochromic, hypsochromic, hyperchromic and hypochromic shifts – Instrumentation and its general applications.

UNIT – III IR SPECTROSCOPY

9

IR spectroscopy – principles – modes of vibration – stretching and bending vibrations – selection rules – finger-print region – Identification of functional groups (alcohols, aldehydes, ketones, amines, amides and carboxylic acids) – Instrumentation and its general applications.

UNIT – IV ELECTROCHEMISTRY

9

Electrode potential – Nernst equation – reference electrodes – standard hydrogen electrode – calomel electrode – glass electrode – electrochemical cells – reversible and irreversible cells – measurement of EMF – batteries – primary battery (dry cell) – secondary battery (lead-acid and lithium ion) – fuel cells – H_2-O_2 fuel cells.

UNIT – V NANO CHEMISTRY

9

Basic concepts of nano science and technology – types of nano particles – preparation, properties and uses of gold, silver and zinc nano particles – quantum wires – quantum dots – Strategies for synthesis of nano particles – top down and bottom up approaches – Biosynthesis of nano particles – natural and artificial production – characterization of nano materials of SEM and TEM.

COURSE OUTCOMES

After successful completion of this course, the student will able to

CO1	Apply the laws of photochemistry and photosensitized reactions	L2
CO2	Know the basic concepts in UV-Visible spectroscopy	L1
CO3	Understand the concepts of IR spectroscopy	L1
CO4	Acquire the information of cell reactions and its application in batteries	L3
CO5	Know the basic concepts of nanotechnology	L1


Total periods: 45

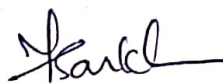
TEXT BOOKS


1. Arun Bahl, Bahl B.S, Tuli G.D, "*Essentials of Physical Chemistry*", Revised Edition, Chand.S & Sons Publishing, New Delhi, 2016 (Unit-I).
2. Sharma Y.R, "*Elementary Organic Spectroscopy – Principles and Chemical Applications*", Revised Edition, Chand.S, 2013 (Unit-II & III).
3. Jain P.C, Monika Jain, "*Engineering Chemistry*", Dhanpat Rai Publishing Co, New Delhi, 2011 (Unit- IV).
4. Pradeep T, "*Nano the essentials*", Tata McGraw Hill Pvt. Ltd, Sixth edition, New Delhi, 2011 (Unit –V).

REFERENCE BOOKS

1. Puri B.R, Sharma L.R, Pathania M.S, "*Principles of Physical Chemistry*", 4th Edition. Vishal Publishing Co, New Delhi (2019).
2. Soni P.L, Dharmarha O.P and Dash U.N, "*Textbook of Physical Chemistry*", Revised Edition, Chand.S & Sons, New Delhi (2016).


Verified
By
(Mr. C. Nandhakumar)


Chairman
Board of Studies
(Dr. T. Sasikala)


Member Secretary
Academic Council
(Dr. D. Jayasheela)

19PH305 – ALLIED LAB – I: ALLIED CHEMISTRY LAB FOR PHYSICS**COURSE OBJECTIVES**

- To know the principles and theory of various analysis and chemical reaction
- To develop the students to understand the applications of chemical principles.
- To know the methods of analyzing organic chemicals qualitatively.

Semester	III
Credit	2
Paper Type	Allied Practical
Max. Marks	CIA: 15 CE : 35 TOT: 50

I. VOLUMETRIC ANALYSIS

1. Estimation of Sodium hydroxide using standard solution of Sodium carbonate.
2. Estimation of Hydrochloric acid using standard solution of Oxalic acid.
3. Estimation of Ferrous sulphate using standard Mohr's salt solution.

II. ORGANIC ANALYSIS

1. Detection of elements (N, S, Halogens).
2. To distinguish between aliphatic and aromatic.
3. To distinguish between saturated and unsaturated.
4. Functional group test for phenols, carboxylic acids (mono & di), aromatic primary amines, amides (mono & di) and carbohydrates.
5. Systematic analysis of organic compounds containing one functional group and characterization by confirmatory tests.

COURSE OUTCOMES


After successful completion of this course, the student will able to

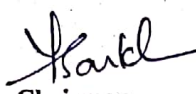
CO1	Analyzes data, interpret results and observe in scientific aspects	L3
CO2	Identify the presence or absence of special elements & functional group present	L3
CO3	Work effectively in diverse teams in laboratory	L1

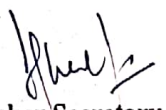
Total Periods: 30

REFERENCE BOOKS

1. Venkateswaran V, Veeraswamy R, Kulandaivelu A.R, "*Basic Principles of Practical Chemistry*", Sultan Chand and Sons, 2nd edition, New Delhi (1997).


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Board of Studies
(Dr. T. Sasikala)


Member Secretary
Academic Council
(Dr. D. Jayasheela)

19PH306-SKILL BASED SUBJECT-I- DIGITAL ELECTRONICS AND APPLICATIONS

COURSE OBJECTIVE

- To enable the students to know the number systems, codes, methods for simplifying Boolean Expressions, logic gates and circuits.
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits. It is also to encourage the students to learn the concepts of A/D, D/A conversions and memories.

Semester	III
Credit	3
Paper Type	SBS
Max. Marks	CIA -30 CE -70

UNIT – 1 NUMBER SYSTEMS AND CODES

11hrs

Digital Vs Analog signals – Decimal, Binary, Octal, Hexa decimal number systems – Conversions and arithmetic operations – 1s and 2s complements – Binary coded decimal (BCD) and arithmetic operations – Weighted and non-weighted codes – Error detection code – Error correction code – Extended binary coded decimal interchange code (EBCDIC) – American standard code for information interchange (ASCII) Code – Parity advantages – Grey code.

UNIT – 2 BOOLEAN ALGEBRA AND LOGIC GATES

11hrs

Basic operations with Boolean variables – Boolean function and truth table – Demorgan's theorem – Simplifications. **Logic Gates:** AND, OR, NOT, EX-OR – Integrated circuit (IC) Implementations – Universal gate (NAND, NOR) – **Graphical representation method:** Karnaugh map method – Simplifications.

UNIT – 3 COMBINATIONAL LOGIC CIRCUITS

11hrs

Arithmetic building block: Half adder – Full adder – Binary parallel adder – Half subtractor – Full subtractor – Binary parallel subtractor – Multiplexer – De multiplexer – Encoder – Decoder – Implementation through IC modules.

UNIT – 4 SEQUENTIAL LOGIC CIRCUITS:

11hrs

Flip Flops: RS, Clocked RS, JK, JK Master-Slave, D and T types. **Shift Register:** Serial – Parallel – Universal Shift registers. **Counters:** Ring – Ripple – Synchronous – Up/Down – Mod 3 – Mod 5 – Decade counter.

UNIT – 5 D/A, A/D CONVERTERS AND MEMORIES

11hrs

DA/Converters: Weighted resistor and binary ladder. **D/A converter specifications:** Definition of resolution and Accuracy. **A/D Converters:** Counter ramp – Comparator/Flash – Dual slope – Successive approximation – **A/D converter specifications:** Definition of Resolution and Accuracy. **Memories:** RAM – ROM – PROM – EEPROM – Flash Memory

COURSE OUTCOME

After the successful Completion of the Course, the students will be able to

CO	Statement
CO1	Explain number systems and codes.
CO2	Realize different logic gates and analyzing the outputs.
CO3	Demonstrate the knowledge of Boolean algebra including algebraic manipulation/simplification, and application of DeMorgan's theorems and Karnaugh map reduction method.
CO4	Analyze and design the combinational and sequential logic circuits.
CO5	Discuss different types of A/D and D/A converter.

Total Periods: 55hrs

TEXT BOOKS:

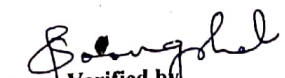
- Roger L. Tokheim "Digital Electronics Principles and applications" – Tata Mc Graw-Hill Pub.Co.Ltd 8th Edition 2013 (Unit I,II,V).
- S. Salivahanan & S. Arivazhagan "Digital Circuits and Design" – Vikas Pub House, 4th Edition 2012 (Unit III, IV & V)

REFERENCE BOOKS:

- Albert P. Malvino and Donald P. Leach, "Digital Principles and Applications" – TMH, 7th Edition 2010.
- Dr. B.R. Guptha & Vandana Singhal, "Digital Electronics" – S.K. Kataria & Sons Millennium Ed 2000.
- R.P. Jain "Modern Digital Electronics" – Tata Mc Graw-Hill Pub.Co.Ltd, 3rd Edition, 2012.


Prepared by

Ms. Sahana Fathima A


Verified by
Dr. Poenguzhali S


Approved by
Academic Council-Secretary

PERSONALITY APTITUDE AND CAREER ENHANCEMENT (PACE-III)

Subject Code: 19CPE03

Common to all the UG streams admitted from AY 2019-20 Onwards

Semester	III
Credit	1
Paper type	Skill based
Max. Marks	Total=100 (Online:50+Verbal Oral: 50)

Instruction Hours per Semester: 40

Aim:

To educate and enrich the students on quantitative ability, reasoning ability, and verbal ability. Equip the students on group behavior and team building skills.

Course Objectives

To enable students to,

- Improve their quantitative ability.
- Improve the ability of arithmetic reasoning
- Enhance their verbal ability through vocabulary building and grammar
- Enhance their linguistic ability.
- Manage emotions through intelligence

Unit I

Quantitative Ability – I

Sequence and Series, Profit And Loss, Time, Speed, Distance, Averages, Percentages, Problems on HCF and LCM, Problems on Ages, Simple Interest & Compound Interest,

Unit II

Reasoning Ability – I

Syllogism, Blood Relations, Puzzles, Analogies, Logical Order, Seating Arrangements, Statement and Conclusions, Most Logical Choice, Inferred Meaning, Data Arrangements,

Unit III

Verbal Ability – I

Vocabulary – Etymology, Root words, Verbal Analogy. Workshop on Reading – Sub-skills of Reading, Techniques of Reading, Jumbled Paragraphs and Jumbled Essays. Application of Grammar concepts – Sentence Construction



Unit IV

Linguistic Ability

Writing & Speaking Skills – Parts of Speech, Modal Verbs, Tenses, Active and Passive Voice, Degrees, Articles, Contextual usage of words – Conversational English

Unit V

Emotional Intelligence

Time Management – Conflict Resolution – Stress & Anger Management – Online presence & researching online – Mind maps – Negotiation & Persuasion – Level 1 & 2 Interview Questions

Course Outcomes


On the successful completion of the course, the student would be able to-

- Enhance their ability to deal with quantities
- Understand and improve arithmetic reasoning.
- Build better vocabulary and grammar
- Speak and write better language.
- Resolve Conflicts, Manage emotions like anger and stress.

References

1. Quantitative Aptitude for Competitive Exams by R. S. Agarwal
2. Quantum CAT by Sarvesh Verma
3. A Modern Approach to Logical Reasoning by R. S. Agarwal
4. Verbal Ability and Reading Comprehension by Arun Sharma
5. Word Power Made Easy by Norman Lewis
6. High School English Grammar by Wren and Martin
7. English Conversation Practice by Grant Taylor
8. Group Discussion and Interviews by Anand Ganguly
9. Art of Social Media by Guy Kawasaki


Verified & Approved by
Course Coordinator


Approved by
Academic Council-Secretary

PERSONALITY APTITUDE AND CAREER ENHANCEMENT (PACE-IV)

Subject Code: 19CPE04

Common to all the UG streams admitted from AY 2019-20 Onwards

Semester	IV
Credit	2
Paper type	Skill based
Max. Marks	Total=100 (Online:50+Verbal Oral: 50)

Instruction Hours per Semester: 40

Aim

To educate and enrich the students on quantitative ability, reasoning ability and verbal ability.
Equip the students on group discussion and interview skills.

Course Objectives

To enable students to,

- Improve their quantitative ability.
- Improve their reasoning ability.
- Enhance their verbal ability through vocabulary building and grammar
- Equip with creative thinking, problem solving and leadership skills
- Build resumes, speak in public, and attend interviews better.

Unit - 1

Quantitative Ability – II

Ratios & Proportions, Clocks & Calendars, Partnerships, Pipes and Cisterns, Surds & Indices,
Problems on Trains, Height and Distance, Races and Games

Unit – 2

Reasoning Ability – II

Mathematical Operations, Cubes & Cuboids, Passage and Inference, Venn Diagrams,
Flowchart & Logical Gates

Unit-3

Verbal Ability – II

Synonyms, Sentence Completion, Antonyms, Selecting Words, Spotting Errors, Sentence Correction, Reading Comprehension, Jumbled Sentences, Theme Detection, Sentence Selection

Unit 4

Group Discussion Skills

Creative Thinking – Problem Solving – Dealing with criticism – Leadership skills – Team Playing skills – Presentation skills – Spontaneity – Empathy – Perseverance – Decision Making

Unit – 5

Interview Skills

Resume Writing Techniques – Types of Resume – Understanding Key Words – JD Mapping.
Interview Techniques – Reiteration of SWOT and Goal Setting – Level 3 Interview
Questions – Importance of Grooming and Non-verbal Communication

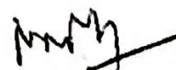
Course Outcomes

On the successful completion of the course, the student would be able to-

- Enhance their ability to deal with quantities
- Understand and improve arithmetic reasoning.
- Build better vocabulary and grammar
- Enhance their creative thinking, problem solving and leadership skills
- Prepare resumes, speak in public and attend interviews better.

References

1. Quantitative Aptitude for Competitive Exams by R. S. Agarwal
2. Quantum CAT by Sarvesh Verma
3. A Modern Approach to Logical Reasoning by R. S. Agarwal
4. Verbal Ability and Reading Comprehension by Arun sharma
5. Word Power Made Easy by Norman Lewis
6. High School English Grammar by Wren and Martin
7. English Conversation Practice by Grant Taylor
8. Group Discussion and Interviews by Anand Ganguly
9. Art of Social Media by Guy Kawasaki



Verified by
Course Coordinator



19CS10 C- Programming Lab

OBJECTIVES

- To be familiar with programming in C Language
- To understand various programs using decision making and looping statements
- To understand simple programs using arrays and functions
- To understand simple programs in structures, pointers and file management

Semester	IV
Credit	2
Paper Type	Allied
Max.Marks	CIA: 15 CE: 35 TOTAL: 50

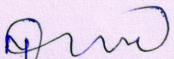
1. Convert temperature from C to F and F to C.
2. Write a C program , to find the refractive index and dispersive power of a prism
3. Write a C program, to find the wavelength and dispersive power of grating
4. Write a C program, to find the radius of curvature in Newton's ring
5. Find refractive index in Newton's ring using c
6. Write a C program, to determine the thermal conductivity in Searle's method
7. Determine the young's modulus of a beam in uniform bending method
8. Write a C program, for the estimation of declined angle.
9. Estimation of average global solar radiation using c program
10. Write a C program, to implement energy density using Plank's law.

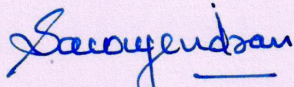
COURSE OUTCOMES

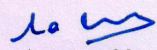
TOTAL PERIODS: 30

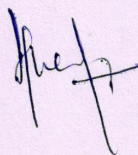
Upon successful completion of the course students will be able to

- Develop programming using basic concepts
- Implement concepts in physics
- Perform mathematical calculations using programming


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School of Computing


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19CSC08 - Computer Programming in C
(Common to Physics & Chemistry)

Semester	IV
Credit	3
Paper Type	Allied
Max. Marks	CIA: 30 CE: 70 TOTAL: 100

OBJECTIVES

- To enable students to learn about the basic features of C Programming Language
- To learn the various decision making and looping statements
- To learn how to program using arrays and functions
- To learn about structures and pointers
- To learn file management and preprocessor in C

UNIT – I**(09)**

Overview of C: History – Importance —Sample programs- Structure of a C Program – Programming Style **Constants, Variables and Data Types:** Character set - C Tokens – Constants, Variables and Data Types. **Operators and Expressions:** Operator and Expressions

UNIT II**(09)**

Decision making and Branching: Decision Making with IF – Simple IF – The IF...ELSE Statement – Nesting of IF...ELSE Statements – ELSE IF Ladder – Switch Statement – ? Statement – GOTO Statement. **Decision Making and looping:** While Statement – DO Statement – FOR Statement

UNIT – III**(09)**

Arrays: Declaring and Initializing Arrays – Declaring and Initializing One Dimensional Array – Declaring and Initializing of Two Dimensional Arrays – Multidimensional Arrays.

User Defined functions: Elements of User Defined Function – Definition of Function – Return Values and Types – Function Call and Declaration - Category of Functions – Recursion

UNIT – IV**(09)**

Structures and Unions: Definition of Structure – Declaring Structure Variable – Accessing Structure Member – Structure within Structure – Structures and Function – Union.

Pointers: Understanding Pointers – Accessing the Address of the Variable – Declaring and initializing pointer variable – Accessing Pointer Variable.

UNIT – V**(09)**

File Management: Defining and Opening the File – Closing a File – I/O Operation on File - Command Line Arguments.

TOTAL PERIODS: 45**COURSE OUTCOMES**

Upon successful completion of the course students will be able to

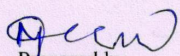
- Explain the basics of programs and programming
- Select appropriate data types and control structures for solving a given problem.
- Illustrate the representation of arrays, strings and usage of string operations.
- Create functions and use structures in programming
- Knowledge of pointers and dynamic memory allocation.
- Explain the basics of file handling mechanism.

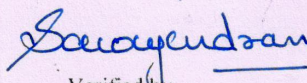
TEXT BOOK:

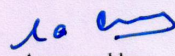
1. E.Balagurusamy "Programming in ANSI C", 4th Ed., Tata McGraw - Hill Publications, 2013.
Unit I :CH 1,2,3, UNIT II : CH 5,6 UNIT III :CH 7,8,9 UNIT IV :CH 10,11 UNIT V : CH 12

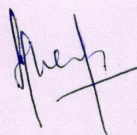
REFERENCE BOOKS :

1. Yashavant Kanetkar, "Let us C", 15th Ed., BPB Publications. 2017
2. Gottfried, "Programming with C", 2nd Ed., TMH Publications 2014


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19PH401 – ELECTRICITY & MAGNETISM**COURSE OBJECTIVES**

- To impart the knowledge of static and dynamic charges, magnetic materials, electromagnetism and magneto statics.

Semester	IV
Credit	4
Paper Type	Core
Max. Marks	CIA:30 CE :70

UNIT – 1 ELECTROSTATICS**11**

Coulomb's law – Gauss's Law – Applications of Gauss law – An insulated conductor – Electric field due to uniformly charged sphere – Electric field due to isolated uniformly charged conducting sphere. Capacitors: Capacitance of a condenser – Energy of a charged condenser – Sharing of energy between two capacitors – Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – capacitors in series and parallel.

UNIT – 2 CURRENT ELECTRICITY**11**

Current – current density – Expression for current density – Equation of continuity – Carey Foster's Bridge – Meter bridge – Potentiometer – Measurement of current, resistance and low voltage. Electromagnetic induction: Faraday's law – Lens law – Fleming's right hand thumb rule – Self Inductance – Self Inductance of a long solenoid – Mutual inductance – Mutual inductance between two solenoids.

UNIT – 3 MAGNETIC PROPERTIES OF MATERIAL**11**

Magnetic induction (B) – Magnetic field intensity (H) – Magnetization (M) – Relation between B, H and M – properties of dia, para and ferro magnetic materials – Antiferro magnetism and ferri magnetism – Electron theory of magnetism – Langevin's theory of para magnetism – Weiss theory of ferromagnetism – Determination of MH curve (horizontal model) – Energy loss due to hysteresis.

UNIT – 4 MAGNETIC EFFECTS OF ELECTRIC CURRENT**11**

Biot Savart's law – Magnetic induction at a point due to straight conductor carrying current – Magnetic induction at a point on the axis of a circular coil carrying current – Force on a current carrying conductor in a magnetic field – Force experienced by an electron moving in a magnetic field – Ampere's circuital law.

UNIT – 5 MAGNETOSTATICS**11**

The Lorentz Force – Force on a current carrying wire – The force per current element of magnetic flux density of B – Magnetic flux – Magnetic flux over a closed surface (or Gauss law in magneto statics) – Torque on a current coil in uniform magnetic field – Equivalence of current loop to a short-magnetized bar (or Magnetic dipole) – Hall effect.

COURSE OUTCOMES

After the successful completion of the course, the students will be able to

CO	Statement
CO1	Understand the fundamentals of static and dynamic charges.
CO2	Classify magnetic materials based on their properties.
CO3	Analyze the concepts involved in electromagnetism and magnetostatics.
CO4	Apply the gained knowledge to solve the problems related to Electricity and Magnetism.

Total Periods: 55**TEXT BOOK:**

- R. Murugesan, "Electricity and Magnetism" – Sultan Chand & Sons, 2017 (Unit I to IV).
- K.K. Tiwari, "Electricity and Magnetism" – Sultan Chand & Sons, 2013 (Unit V).

REFERENCE BOOKS:

- Sehgal, Chopra and Sehgal "Electricity and Magnetism" – Sultan Chand & Sons, 2004.
- Brijlal and Subramaniam, "Electricity and Magnetism" – RatanPrakashan Educational and University Pub, 2007.

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Mr Gowrisankar G

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19PH402 –PRACTICAL – IV – GENERAL EXPERIMENTS –IV**COURSE OBJECTIVE**

- To learn the optical, electrical and magnetic properties of certain materials practically.

Semester	IV
Credit	3
Paper Type	Practical
Max.Marks	CIA:30 CE :70

LIST OF EXPERIMENTS

1. Moment of the magnet -Tan C method
2. Spectrometer – id curve – Refractive index of prism
3. Field along the axis of the coil – Moment of the magnet
4. Potentiometer – Calibration of low range voltmeter
5. Potentiometer – Calibration of high range voltmeter.
6. E/M by Thomson Bar Magnet
7. Spectrometer – Dispersive power of prism
8. Spectrometer – Dispersive power of grating

COURSE OUTCOMES

After the completion of the course the students will be able to

CO	Statement
CO1	Calibrate the low range and high range voltmeter
CO2	Calculate the refractive index and dispersive power of prism
CO3	Determine the moment of the bar magnets
CO4	Develop team working skills through group experiments

Total Period: 32 hrs

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29/12/2020
Ms Sahana Fathima A

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Dr Poonguzhali S

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Academic Council Secretary
Academic Council Secretary

19PH403 –PRACTICAL – V – GENERAL ELECTRONICS LAB

COURSE OBJECTIVE

- To design simple circuits using basic gates
- To write simple program using 8085 Microprocessor

Semester	IV
Credit	2
Paper Type	Practical
Max.Marks	CIA:15 CE :35

LIST OF EXPERIMENTS

1. Verification of Binary to Gray & Gray to Binary convertors
2. Verification of Half adder & Full adder
3. Verification of Multiplexer & Demultiplexer
4. Verification of Adder & Subtractor circuit using IC741.
5. Astable Multivibrator using IC 555
6. Write a program for Addition and Subtraction of 8-bit Data using 8085 Microprocessor
7. Write a program for Multiplication and Division of 8-bit data using 8085 Microprocessor
8. Write a program for 1's and 2's complement of 8-bit data

COURSE OUTCOMES

After the successful completion of the course, the students will be able to,

CO	Statement
CO1	Apply the knowledge of basic gates and for circuit designing
CO2	Write simple programs using 8085 microprocessor instructions
CO3	Develop team working skills through group experiments

Total Period: 24 hrs

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19PH405 – INTEGRATED CIRCUITS AND 8085 MICROPROCESSOR**COURSE OBJECTIVES**

- To enable the students, to understand the various steps involved in IC fabrication, apply the concept of Operational amplifiers
- To learn the Architecture, operation and Instruction set of 8085 Microprocessor.

Semester	IV
Credit	3
Paper Type	SBS
Max. Marks	CIA:30 CE :70

UNIT– 1 FABRICATION OF IC'S

09

Classification of ICs function – Linear Integrated Circuits – Manufacturers Designation of LIC's – Digital Integrated Circuits – Crystal growing and Wafer Preparation – Oxidation – Etching – Diffusion – Ion Implantation– Photo lithography – Epitaxy – Integrated Devices (Resistors& Capacitors)

UNIT – 2 OPERATIONAL AMPLIFIER

09

Op-Amp parameters – Inverting amplifier– Non-Inverting amplifier – Summing amplifier – Differential amplifier – Integrator – Differentiator.

UNIT – 3 MICROPROCESSOR ARCHITECTURE

09

8085 Bus Organization – Memory classification – I/O Devices – Microprocessor Communication and Bus Timing – Demultiplexing the Bus AD_7-AD_0 – Generating control signal – Block diagram of 8085 Microprocessor Architecture – Op-code fetch – Memory Read – I/O Read – Memory write – I/O write.

UNIT – 4 INSTRUCTION SET

10

Instruction cycle – Instruction Set – Data transfer Instructions – Arithmetic Instructions – Logical Instructions – Branch Instructions – Stack, I/O and Machine control Instructions.

UNIT – 5 ADDRESSING MODES & PROGRAMMING

08

Addressing Modes – Direct addressing – Register addressing – Register addressing – register indirect addressing – Immediate addressing – Interrupts (Hardware and software Interrupts)

Delay program – Delay calculation – Addition and Subtraction of 8 bit data.

COURSE OUTCOMES

After the successful Completion of the Course, the students will be able to

CO	Statement
CO1	Understand the basics of IC fabrication process
CO2	Explain the concept of operational amplifiers in various application
CO3	Familiarize the architecture, instruction set, addressing modes and programming 8085 microprocessor

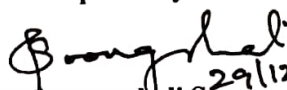
Total Periods: 45**TEXT BOOK:**

- R.S.Sedha, "A Text Book of Applied Electronics", S.Chand & Company Ltd, 1st edition, 2014. (Unit I-II)
- R.Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085" Penram International Publishing, 5th edition, 2011. (Unit III – V)

REFERENCE BOOKS:

- K. R. Botkar, "Integrated Circuits", Khanna Publishers – 4th reprint, 2008.
- D. Roy Choudhury, Shail B. Jain., "Linear Integrated circuits" New Age International (P) Limited, 2nd edition 2018.
- B.RAM, "Fundamentals of Microprocessors and Microcomputers", Dhanpat raj publications(P) Ltd, 4th Revised and Enlarged Edition, 2005.
- Aditya P Mathur, "Introduction to Microprocessor", TataMcGraw-Hill, 3rd edition 2002.

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Academic Council-Secretary

19PHE01-ENERGY PHYSICS

COURSE OBJECTIVES

- To make the students to understand about the types of energy sources, Solar radiation measurements, Application of solar energy, Wind energy, Bio energy and Geothermal energy.

Semester	IV
Credit	4
Paper Type	Elective
Max. Marks	CIA:30 CE :70

UNIT- 1 ENERGY SOURCES

11

Conventional and Non-conventional Sources- Solar Energy- Wind Energy- Energy from biomass and biogas - Ocean thermal energy- Tidal energy - Geothermal energy- Hydrogen Energy- Renewable energy sources, Prospects and advantages.

UNIT- 2 SOLAR RADIATION, MEASUREMENTS AND APPLICATIONS

11

Solar constant - Solar radiation at the earth surface- Solar radiation geometry - Pyrheliometer - Pyranometer- Sunshine recorder.

Application of solar energy: Solar water heating- Solar photovoltaic cells - Solar Distillation- Solar Pumping - Solar Furnace- Solar Cooking- Solar Greenhouses - Solar pond- Application of solar pond.

UNIT- 3 WIND ENERGY

11

Basic Principle of wind energy conversion- Nature of wind- Power in the wind- Forces on the blades and thrust on the turbines- Wind energy conversion- Lift and drag- Basic components of wind energy conversion systems and its classification- Advantages and Disadvantages of WECS - Application of wind energy.

UNIT - 4 BIOENERGY

11

Biomass - Biomass conversion technology- wet and dry processes - Photo synthesis- Biogas generation- Factors affecting biogas generation - Classification of biogas plants - Biogas from plant wastes - Wet and dry fermentation - Kachra gas plant - Materials used for biogas generation - Problems related to biogas plants.

UNIT- 5 GEOTHERMAL ENERGY

11

Nature of Geothermal Fields - Geothermal Sources- Hydrothermal System- Geopressured system- Hot Dry rocks- Magma resources - Vapour dominated system- Characteristics of geothermal steam electric plants- Liquid dominated system - The flashed steam system- Advantage and Disadvantage of geothermal energy- Application of geothermal energy.

COURSE OUTCOME:

After the successful Completion of the Course, the students will be able to

CO	Statement
CO1	Compare the types of energy sources and understand solar radiation measurement techniques and its applications
CO2	Acquire the knowledge of power generation utilizing wind energy
CO3	Compare the types biogas plants
CO4	Summarize geothermal energy characteristics, applications, advantages and disadvantages

Total Periods: 55

TEXTBOOK:

- G D Rai, "Non-Conventional Energy sources"-Khanna Publishers, 5th Edition, 2011 (Unit I - V).

REFERENCE BOOKS:

- B. H. Khan, "Non-Conventional Energy Resources"-Tata McGraw- Hill Pub. Co. Ltd. Delhi, 3rd edition, 2006.
- Chetan Singh Solanki, "Solar Photo Voltaic Technology and Systems"-Eastern economy Edition, July-2nd edition, 2015.
- G D Rai, "Solar Energy Utilization"-Khanna Publishers, 1st edition, 2001.

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19PHE02 - MATERIAL SCIENCE

COURSE OBJECTIVES

- To familiarize the properties of semiconductor, magnetic and optical materials and apply the concept in different applications.

Semester	IV
Credit	4
Paper Type	Elective
Max. Marks	CIA:30 CE :70

UNIT – 1 CONDUCTING MATERIALS

13

Classical free electron theory of metals – Electrical conductivity expression – Drawbacks classical theory, quantum theory, free electron theory of metals – It's importance – Elective mass of electron – Concept of hole – Origin of band gap in solids (qualitative treatment only) conductors, copper and aluminium – High Resistivity alloys – Super conductors – Properties and applications

UNIT – 2 SEMICONDUCTOR MATERIALS

10

Elemental and compound semiconductors and their properties – Carrier concentration in N-type and P-type semiconductors – Variation of carried concentration with temperature and its influence – Hall Effect – Experimental arrangement – Applications of Hall Effect

UNIT – 3 MAGNETIC MATERIALS

13

Different types of magnetic material and their properties – Heisenberg and domain theory of ferromagnetism – Hysteresis – Energy product of a magnetic material – Ferrite and their applications – Magnetic recording materials – Tapes and discs – Active and passive dielectrics and their frequency and temperature dependence – Internal field and deduction of Clausius-Mosotti equation – Dielectric loss – Different types of dielectric breakdown – Classification of insulating materials and their applications.

UNIT – 4 OPTICAL MATERIALS

10

Optical properties of metals, insulators and semiconductors – Excitons, traps, colour centres and their importance – Phosphorescence and fluorescence – Different phosphors used in CRO screens – Liquid crystal as display materials – Twisted pneumatic display – Construction and working of LED – LED materials – Thermography and its applications – Photoconductivity and photo conducting materials

UNIT – 5 MODERN ENGINEERING MATERIALS

09

Metallic glasses - Metallic glasses as transformer core materials – Nanophase material – Shape memory alloys – Advanced ceramic materials – Polymers – Non-linear materials and their applications

COURSE OUTCOMES

After the successful Completion of the Course, the students will be able to

CO	Statement
CO1	Differentiate the properties of conducting and semiconducting materials and their applications.
CO2	Understand the concepts of magnetic and dielectric materials.
CO3	Compare the optical properties of Conducting, Non-conducting material and have a knowledge of modern engineering materials.

Total Periods: 55

TEXT BOOK:

- M. Arumugam, 'Material science', Anuradha Technical Book Publishers, 2005 (Unit I – V).

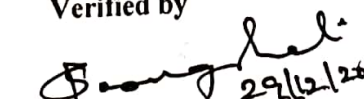
REFERENCE BOOKS:

- S.O. Pillai, "Solid state physics", New Age INC, 2016.
- L. Van Vlac, "Material science for engineers", Addison Wesley, 2002.
- W. D. Kingery. H. K. Bowen and D. R. Unimann, "Introduction to Ceramics", John Wiley and sons, 2004.

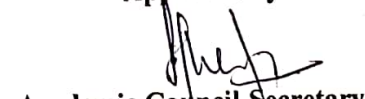
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19PHE03–THERMAL PHYSICS

COURSE OBJECTIVES

- To understand the Basic Principles of thermometry, Nature of heat and Transmission of heat.

Semester	IV
Credit	4
Paper Type	Elective
Max. Marks	CIA:30 CE :70

UNIT – 1 MEASUREMENTS OF TEMPERATURE

11

Basic principle – Liquid thermometer – Mercury thermometer – Errors and correction – Clinical thermometer – Gas thermometer – Principle – Standard constant volume thermometer – Electrical resistance thermometer – Principle – Platinum resistance thermometer – Construction and working – Thermoelectric thermometer

UNIT– 2 NATURE OF HEAT

12

Andrews experiment on CO₂– Results of Importance –Amagatt's experiments – Results and discussion – Van der waals equations of state – Critical constants– Reduced equation of state –Law of corresponding state –Low temperature physics – Historical perspective – Critical constants and joule – Thomson effect – Porous plug experiment – Theory and results – Liquefaction of gases – Principle of serious refrigeration – Liquefaction of hydrogen, helium – Properties of liquid He – I and II

UNIT – 3 CONDUCTION OF HEAT

10

Thermal conductivity – Thermal diffusivity – Thermal investigations – Experimental determination of thermal conductivity – Searle's method – Lee's method –Forbes method – Thermal conductivity of bad conductors –Lees method – Conductivity of gases – Widemann – Franz law – Practical application – Convection –Application in science and domestic – Radiation –Introduction –Sources.

UNIT – 4 THERMODYNAMIC RELATIONSHIP

12

Heat engines – Carnot ideal engine – Carnot cycle–Carnot's refrigerator – Efficiency – Carnot's theorem and corollary – Entropy – Entropy of an ideal gas – T-S diagram – Entropy and reversible and irreversible processes – Principle of in entropy – Application of second law – Third law of thermodynamic relations –Application– Specific heat equations – Latent heat equation – Variation of intrinsic energy with volume – Contract on heating – Joule's kelvin effect (any three)

UNIT – 5 STATISTICAL PHYSICS

10

Statistical mechanics – Statistical equilibrium – Probability – Theorem in Statistical thermodynamics – Maxwell Boltzmann distribution in terms of temperature – Maxwell boltzmann distribution and ideal gas – Quantum statistics– Phase space – Fermi dirac distribution law – Electron gas – Bose Einstein distribution law – Photon gas – Comparison of the three statistics.

COURSE OUTCOMES

After the successful Completion of the Course, the students will be able to

CO	Statement
CO1	Discuss the basic principles of thermometry
CO2	Analyze the concepts of nature and transmission of heat.
CO3	Explain the concept of thermodynamical relationships.
CO4	Understand the basic concept of Statistical Physics

Total Periods: 55

TEXT BOOK:

- Charles Kittel, "Thermal Physics", Wh. Freeman pub. USA,2000 (Unit I'- III)
- D. S. Mathur, "A Text Book of Heat", S. CHAND & CO, 2005 (Unit IV & V)

REFERENCE BOOKS:

- J. B. Rajam, "A text book of heat", S. Chand & co 2004.
- M. N. Saha & B. N. Srivatsava, "A Treatise on Heat", Science Book Agency Calcutta, 2000.

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