

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)

Re-accredited (**3rd Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF PHYSICS



CBCS SYLLABUS

BACHELOR OF SCIENCE

PROGRAMME CODE - P

COURSE STRUCTURE

(w.e.f. 2021 – 2022 Batch onwards)



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CRITERION - I

1.1.3 Details of courses offered by the institution that focus on employability / entrepreneurship / skill development during the year.

Syllabus copies with highlights of contents focusing on
Employability / Entrepreneurship / Skill Development



To be Noted:

HIGHLIGHTED COLORS	COURSES
	Employability
	Skill Development
	Entrepreneurship
	Skilled & Employability

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CBCS

DEPARTMENT OF PHYSICS-B.Sc
(w.e.f. 2021-2022 onwards)

COURSE STRUCTURE-SEMESTER WISE

Sem	Part	Subject code	Title of the paper	Teaching hrs.(Per week)	Duration of exam (hrs)	Marks allotted			Credits
						C.A	S.E	Total	
V	III	21P51	Core: Atomic and Nuclear Physics	4	3	25	75	100	4
	III	21P52	Core: Programming with C	4	3	25	75	100	4
	III		Elective –I	4	3	25	75	100	4
			Core: Major Physics Practical – III	3	-	-	-	-	-
			Core: Major Electronics Practical – IV	3	-	-	-	-	-
			Major Elective –Project	2	-	-	-	-	-
		21AKP5	Allied II: Inorganic, Physical and Medicinal Chemistry	4	3	25	75	100	4
			Allied II : Practical II- Volumetric Analysis	2	-	-	-	-	-
	IV	21SEP51	SBE: Fibre optic communication	2	3	25	75	100	2
VI		214EV5	Environmental studies	2	3	25	75	100	2
	III	21P61	Core: Solid State Physics	4	3	25	75	100	4
	III	21P62	Core: Spectroscopy	4	3	25	75	100	4
	III		Elective –II	4	3	25	75	100	4
		21P61P	Core: Major Physics Practical – III	3	3	40	60	100	5
		21P62P	Core: Major Electronics Practical – IV	3	3	40	60	100	5
			Elective-III Project	2	3	20	80	100	3
		21AKP6	Allied II: Analytical and Inorganic Chemistry	4	3	25	75	100	4
		21AKP6P	Allied II: Practical II- Volumetric Analysis	2	3	40	60	100	1
	IV	21SEP61	SBE: Introduction to Microcontrollers 8051	2	3	25	75	100	2

		214VE6	Value education	2	3	25	75	100	2
	V	215NS4/ 215PE4	Extension Activities NSS/Phy. Education	-	3	25	75	100	1

Electives

Semester V (Elective I- Choose any one)

1. Electronics -21PE5A

2. Numerical methods -21PE5B

Semester VI (Elective II- Choose any one)

1. Theoretical Physics -21PE6A

2. Applications of Electronic Devices and Instrumentation -21PE6B

Elective-III Project - 21PPR6

Allied – Physics for Chemistry students
CBCS

Class	Sem	Sub Code	Title of the paper	Teaching hrs(Per week)	Duration Of exam (hrs)	Marks allotted			
						C. A	S.E	Total	Credits
III Chemistry	V	21AP3	Electricity and Electronics	4	3	25	75	100	4
			Allied : Physics Practical-II	2	-	-	-	-	-
III Chemistry	VI	21AP4	Optics	4	3	25	75	100	4
		21AP4P	Allied : Physics Practical-II	2	3	40	60	100	1

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(w.e.f. 2021-2022 onwards)

Title of the Paper : Atomic and Nuclear Physics**Semester : V****Contact Hours : 4****Subject Code : 21P51****Credits : 4****Objectives:**

To familiarize the students with

1. The Atomic structure and various atom models
2. Elementary Particle Physics and nuclear models
3. Types of Particle accelerators and detectors

Unit: I**Atomic Structure**

Thomson Model of the Atom-Rutherford experiment- Scattering of α particles and Rutherford model of the atom-Rutherford scattering of α particles-Bohr model of the atom-Bohr's theory of the hydrogen spectrum-Spectral lines for hydrogen atom-Energy level of hydrogen atom.

Unit: II**Vector Atom Model**

Vector atom model- Spinning electron-Quantum numbers associated with the vector atom model- Coupling schemes- Applications of spatial quantization- Application of the vector model- Pauli's exclusion principle- Electronic structure in atom-Example of electronic configurations- Fine structure of spectral line

Unit: III**Nucleus & Nuclear Models**

Introduction- Constituents of the nucleus- Quantitative facts about nucleus- Binding energy- Nuclear angular momentum-Yukawa theory of nuclear forces- Liquid drop model- Shell model- Collective model.

Unit: IV**Particle Accelerators& Radiation Detectors**

Introduction- Cockcroft and Walton Accelerator- Betatron- Synchrocyclotrons- Synchrotrons- Ionization Chamber- Scintillation Detectors- Cloud Chamber- Bubble Chamber – Spark Chamber.

Unit: V**Particle physics**

Introduction- Types of interactions- Classification of elementary particles- Quantum Numbers- Conservation Laws(Charge, Baryon number, Lepton number, Isopin).

Text Books:

1. Mittal V.K, Verma R.C, Gupta S.C , *Introduction to Nuclear and particle physics*, PHI Learning Private Ltd, New Delhi, Second Edition ,2011.(UNIT- I,III,IV,V)
2. Subrahmaniyam .N, Brijlal, *Atomic and Nuclear physics* S.Chand and company ltd, First Edition, New Delhi,1984.(UNIT- I,II)

Unit: I	Chapter:	1.2,2.13-2.16
Unit: II	Chapter:	5.2,5.3,5.5,5.7
Unit: III	Chapter:	2.1-2.3,2.5
Unit: IV	Chapter:	6.1, 6.2, 6.8, 6.9, 6.11, 7.3, 7.6, 7.8 -7.10
Unit: V	Chapter	8.1,8.3,8.4,8.6,8.7(8.7.1-8.7.4)

Reference Books:

1. Basu C.R, *Atomic and nuclear physics*, New Central Book Agency (P) Ltd, Calcutta, First Edition, 2005.
2. Devanathan .V, *Nuclear Physics*, Narosa Publishing House Private Ltd, New Delhi, Second Edition, 2011.
3. Dayal D.C, *Nuclear physics*, Himalaya Publishing House, Mumbai, First Edition, 2012.
4. Gupta A.B, *Physics of the Atom*, Books And Allied Private Ltd, Kolkata, First Edition,2012.
5. Rajam .J.B., *Atomic Physics*, S. Chand and Company Ltd, New Delhi, First Edition, 2002.

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(w.e.f. 2021-2022 onwards)

Title of the Paper	: Programming with C		
Semester	: V	Contact Hours	: 4
Subject Code	:21P52	Credits	: 4

Objectives:

1. Enable to write programmes using C.
2. To Know the basics of operators and expressions in C Programmes.
3. To get the knowledge about branching and Looping concepts in C Programmes.
4. To study the basics of arrays and functions in C Programmes.

Unit-I Overview of C

History of C – Importance of C –Sample C. Programs – Basic structure of C Programs

- programming style – executing a C Program.

Constants, Variables and Data Types

Introduction - Character set – C Tokens – Keywords and Identifiers – Constants -

Variables- Data Types - Defining symbolic constants.

Programs: Adding two numbers - Interest Calculation-Multiplication of two numbers**Unit-II Operators and expression**

Introduction – Arithmetic of operators - Relational operators – Logical operators –

assignment operators – increment and decrement operators. Conditional operator – Bitwise

operators - special operators – arithmetic expressions - evaluation of expressions precedence

of arithmetic operators – some computational problems - Type conversions in expressions –

operators' precedence and associativity – Mathematical Functions.

Program: covert a given numbers of days into months and days- sequence of squares of numbers.**UNIT-III Managing Input and output operations**

Introduction – Reading a Character – Writing a Character – Formatted input –

Formatted output.

Decision making, branching and looping

Introduction – Decision making with if statement – simple if statement – The if ...else statement – Nesting of if ...else statements — The switch statement – The ? : operator – The goto Statement - The while statement – The do Statement – The for statement – Jumps in Loops.

Program: Test the Character type using if...else(Problem 5.2), Use of if for counting(Problem 6.2), Selecting the largest of three numbers(Problem 6.4), to read and print name of the months(Problem 6.6), print all prime numbers between 1 and n (Problem 7.5).

Unit-IV Array

Introduction-one dimensional Arrays-declaration of one dimensional arrays - initialization of one dimensional arrays- two dimensional arrays- initialization of two dimensional arrays- Multi-Dimensional Arrays – Dynamic Arrays.

Program: two's complement of a binary number (Problem 8.3), Transpose of a matrix (Problem 8.7), N X N matrix multiplication (Problem 8.8).

Unit-V User - define Functions

Introduction – definition of functions – return values and their types – Function Call – Function Declaration – Category of Functions - No Arguments and no return values – Arguments but No Return Values – Arguments with return values – No Arguments but returns values– Nesting of Functions – Recursion

Program: Interest calculation programs (Problem 10.1, 10.2, 10.3)

Text Book:

1. E.Balagurusamy, Programming in ANSI C, Tata McGraw Hill Company, New Delhi, 8th Edition, 2019.

Chapters:

Unit: I	Chapters 2,3	Page No: 17-31,39-49,58-59
Unit: II	Chapter 4	Page No: 68-89
Unit: III	Chapter 5,6,7	Page No: 100-120,131-141,145-155, 171-193
Unit: IV	Chapter 8	Page No:212-236
Unit: V	Chapter 10,11	Page No: 291,295-315

Reference Books:

1. Brijendra Singh, Data communications and Computer Networks, second edition.
2. Kamthane Ashok.N, (2013), "Programming in C", 2nd Edition, Pearson Education.
3. Yashvant P. Kanetkar, (2008), "Let us C", 8th Edition, Infinity science press.

4. Brian W. Kernnigham and Dennis M. Ritchi, The C programming language, 2nd Ed. Prentice-Hall of India Pvt. Ltd.
5. Henry Mullish and Herbert L Cooper, The spirit of C, 15th Ed, Jaico Publishing house.

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To introduce the fundamentals of

1. The various rectifiers and filters built of diodes and fundamentals of transistors
2. Operation of power Amps and Op Amps, Types of FETs and Oscillators
3. Sequential circuits their action and Converters

Unit: I Diode Circuits and Transistor fundamentals

The Half Wave Rectifier-The Full Wave Rectifier-The Bridge Rectifier-The Choke
Input Filter-The Capacitor Input Filter-Clipppers and Limiters-Clampers-The Zener Diode-The
Loaded Zener Regulator.

Unit: II Power Amplifiers and FETs

Darlington connections- Amplifier terms-Two load lines-Class A operation-Class
B operation -FETs Basic ideas-Drain curves-The Transconductance curve-Biasing in the
Ohmic region-Biasing in the active region- Transconductance-The Depletion mode MOSFET.

Unit: III Operational Amplifiers and Oscillators

Introduction to Op Amps-The 741 Op Amp-The Inverting Amplifier-The Non
Inverting Amplifiers-Theory of Sinusoidal Oscillation-The Wein's bridge Oscillator-The
Colpitt's Oscillator-The 555 timer-Astable operation of the 555 Timer.

Unit: IV Digital Sequential Circuits

Introduction-RS flip flops-Gated flip flop- D flip flop -JK flip flop-JK master slave flip flop -Types of Shift registers-Serial in Serial out-Serial in Parallel out.

Unit: V Counters and converters

Asynchronous counters-Synchronous counters-Decade counter-Variable resistor networks-Binary ladders-D/A converters-A/D converters.

Text Books:

1. Malvino .A.P, *Electronic Principles*, Tata Mc Graw Hill, New Delhi, Seventh Edition, 2002.
[UNITS: I, II, III]
2. Donald Mavino .A ,Leach .P, Saha Gautam, *Digital Principles and applications*, Tata Mc Graw hill, New Delhi, Sixth Edition, 2002. [UNITS: IV, V]

Unit: I	Chapters	4.1,4.3-4.6, 4.10, 4.11, 5.1, 5.2
Unit: II	Chapters	11.4,-12.1-12.4, 13.1-13.6, 14.1
Unit: III	Chapters	18.1-18.4, 23.1, 23.2, 23.4, 23.7, 23.8
Unit: IV	Chapters	8.1, 8.2, 8.4, 8.5, 8.8, 9.1-9.3
Unit: V	Chapters	10.1, 10.3, 10.5, 12.1-12.4,12.6

Reference books:

1. Chetan .D Pariksh, Christos Halkias, Jacob Millman, Millmans, *Integrated Electronics- Analog and digital Circuits and Systems*, Tata Mc Graw hill, New Delhi, Second Edition, 2012.
2. Ghosh .B, *Fundamental Principles of Electronics*, Arunabha Sen Books and Allied (p) Ltd, Kolkata, Second Edition, 2011.
3. Jose Robin .G, Ubaldraj .A, *Analog electronics and Digital Electronics*, Indira Publications, Marthandam, First Edition, 2008.
4. Rohit Mehtha, V.K. Mehtha, *Principles of electronics*, S. Chand And company Ltd, New Delhi, Eleventh Edition, 2012
5. Santhiram Kal, *Basic Electronics, Devices circuits and IT fundamentals*, PHI Learning Private Learning, New Delhi, First Edition, 2010.

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1. To introduce the fundamentals of Solving different kinds of problems occurs in computer applications using Numerical Methods.
2. To study the various numerical methods to solve the Mathematical equations.
3. To know the basic concepts differentiation and integration.
4. To obtain the knowledge about differential equations.

Unit- I**Theory of Equations and Root of Equations**

Introduction –Formation of Equations – Relation between Roots and Coefficients–

Errors in numerical computation method - Order of convergence - Iterative method -Successive approximation method - Bisection method – Method of false position.

Unit- II**Simultaneous equations**

Newton Raphson method - Gauss elimination method – Gauss Jordan method – Gauss

Seidel Iteration method (problems only).

Unit- III**Interpolation**

Newton's interpolation formulae – Central difference interpolation formula (problems only) – Lagrange's interpolation.

Unit- IV**Numerical Differentiation and Integration:**

Newton's forward and backward difference formulae – Numerical integration – Trapezoidal rule – Simpson's 1/3 rule (problems only).

Unit- V**Differential equations**

Numerical solution of ordinary differential equations – Taylor's series method- Euler's method – Runge kutta method (2nd & 4th order) (problems only).

Text Book:

1. Arumugam .S, Thangapandi Issaac .A, Somasundaram .A, *Numerical methods*, Scitech Publications (India) PVT Ltd, Chennai, 2002.

Unit: I	Chapters	1.1-1.3, 3.1, 3.2, 3.4
Unit: II	Chapters	4.3, 4.4, 4.8
Unit: III	Chapters	7.1-7.3
Unit: IV	Chapters	8.1-8.2, 8.5
Unit: V	Chapters	10.1-10.4

Reference Books:

1. Kandasamy P, Thilagavathy K Gunarathy K, *Numerical Methods*, S.Chand and Company Ltd, New Delhi, Third Edition. 2003.
2. Dr.Vedamurthy V.N, Dr.Iyengar.N.Ch.S.N , *Numerical Methods*, Vikas Publishing House PVT Ltd, Chennai 2008.
3. Rao V. Dukkipati, *Numerical Methods*, New Age International (p) Limited, Publishers, New Delhi, First Edition, 2010.
3. Sastry .S.S, *Introductory Methods of Numerical Analysis*, Prentice Hall Of India Private Ltd, New Delhi, 2008.
4. Singaravelan, *Numerical Methods*, Meenakshi Agency, Channai, Sixth Edition, 2008.

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To familiarize the students with

1. The Principles of Fibre Optic communication
2. Various systems and components
3. Some devices and applications in the Fibre optic communication.

Unit: I**Introduction to fibre optic communication:**

Introduction – Advantages of optical fibre communication-Types of optical fibres- Numerical Aperture of optical fibre- Fibre bundles and cables- Fibre strength- Fibre optical properties.

Unit: II**Fibre optical source devices:**

Types of optical sources- operation principle in LED and Laser- External Quantum Efficiency of LED- LED modulation Bandwidth- Coupling of LEDs with fibre – Edge Emitting LEDs.

Unit: III**Fibre optical communication components:**

Introduction- Coupling components for optical Fibres- Modulation methods and modulators- switches- Transmitters- receivers- Optical amplifiers.

Unit: IV**Fibre optical communication systems:**

Elementary fibre optic communication systems- Wavelength division multiplexing-
optical Time Division multiplexing- Data buses.

Unit : V**Fibre optical networks:**

Local Area network system- FDDI- SONET and SDH Networks- ISDN,BISDN and
High speed Networks- Microwave technology Applications of Light wave systems.

Text Book:

1. D.C.Agarwal, *Fibre Optic Communication* , S.Chand & Company Pvt. Ltd , New Delhi, Fifth edition, 2002.

Unit: I	Chapter	1.1,1.2, 1.4 to1.8
Unit: II	Chapter	2.1 to 2.6
Unit: III	Chapter	5.1 to 5.6, 5.10
Unit: IV	Chapter	1.3, 6.6 to 6.8
Unit: V	Chapter	6.9 to6.12, 6.14

Reference Books:

1. Anuradha D , *Optical Fibre And Laser*, New Age International (p) Ltd, New Delhi, Second Edition, 2009.
2. Govind Agrawal .P, *Fibre Optic Communication Systems* ,Wiley India (p) Ltd ,New Delhi, Third Edition, 2007.
3. MukundaRao .M, *Optical communication*, Universities Press (India) Pvt Ltd, Hyderabad, First Edition, 2000.
4. Sarkar C.K, sarkar D.K , *Optoelectronics And Fibre Optics Communication*, New Age International (p) Ltd , New Delhi, First Edition 2001.
5. Subir Kumar Sarkar, *Optical Fibre and Fibre Optic Communication System*, S. Chand & Company Ltd , New Delhi, First Edition , 1997 .

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To expose the students to

1. The bonding in solids.
2. Crystal Physics and part of X-rays in structure determination.
3. Magnetic materials and their properties.

UNIT-I Interatomic force & bonding in solids:

Interatomic force: Introduction – Force between atoms-Cohesion of Atoms and Cohesive energy-calculation of cohesive energy.

Bonding in solids: Ionic Bonding –Bond energy of NaCl Molecule-Calculation of Lattice energy of Ionic crystal- The Born –Haber cycle –Properties of Ionic solids – Examples of Ionic solids –Covalent bond –Metallic bond –Hydrogen bond.

UNIT-II Crystal physics:

Introduction –Lattice points and space lattice –Unit cells and Lattice parameters-Crystal systems-Metallic crystal structures for SC, BCC, & FCC structures - Other cubic crystal structure - Miller Indices & important features of Miller Indices.

X-ray diffraction & diffraction method: Bragg's law –Derivation of Bragg's equation.

UNIT-III Magnetism in solids:

Magnetic Terminology –Types of Magnetism –Dia magnetism -(Langevin's classical theory)-Paramagnetism -(Langevin's classical theory)-Ferro magnetism-Weiss theory-concepts of Domains and Hysteresis- Anti Ferro magnetism-Ferri magnetism.

UNIT-IV Super conductivity:

Introduction –Electrical Resistivity –Perfect Diamagnetism or Meissner Effect – Super currents and Critical Temperature -Type-I –Type-II Superconductors- High temperature Ceramic Super Conductors-Applications

UNIT-V Semi conductors:

Introduction –Pure or Intrinsic Semiconductors –Impurity or Extrinsic Semiconductor –Drift velocity, Mobility and conductivity of intrinsic semiconductors-Carrier concentration and Fermi level for intrinsic semiconductors- Carrier concentration and Fermi level for extrinsic semiconductors

Text books:

1. Pillai S.O, *Solid state physics*, New Age international (p) Limited, New Delhi, Sixth Edition, 2012. (UNITS-I, II)
2. Puri.R.K, Babbar V.K, *Solid state physics*, S. Chand publications, New Delhi, First Edition, 2010. (UNITS-III, IV, V)

UNIT I	: Chapter	3.1-3.8,3.11-3.14,3.19,3.24
UNIT II	: Chapter	4.1, 4.2, 4.4, 4.6, 4.15, 4.17-4.19, 5.7, 5.8, 5.12
UNIT III	: Chapter	8.1-8.3,8.3.1,8.4(8.4.1),8.5(8.5.1,8.5.3),8.6,8.7
UNIT IV	: Chapter	10.1-10.6,10.6.1,10.6.2,10.13,10.14
UNIT V	: Chapter	7.1-7.6

Reference Books:

1. Charles Kittel, *Introduction to solid state physics*, Wiley Publication, Noida, Seventh Edition, 2011.
2. Ilogavan.K, *Solid state physics*, Publisher by S.Vishwanathan (printer and publisher), Chennai, First Edition, 2007.
3. Nandita Dasgupta and Amitava Dasgupta, *Semiconductor devices modeling and technology*, PHI Learning private limited, New Delhi, 2011.
4. Srivastava J.P, *Elements of solid state physics*, PHI Learning private limited, New Delhi, Third Edition, 2011
5. Wahab M.A, *Solid state physics structure and properties of material*, Narosa publishing house, New Delhi, Second Edition, 2007.

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Title of the Paper : Spectroscopy**Semester : VI****Contact Hours: 4****Subject Code : 21P62****Credits : 4****Objectives:**

This paper aims to impart comprehensive knowledge among students in about

1. To get the basic idea about the spectra of atoms.
2. To attain the knowledge about the rotation of different molecules.
3. To import the basic concepts different types of Spectroscopy.

UNIT I Spectra of atoms

Angular Momentum of Many Electron Atoms -Normal Zeeman effect-Anomalous Zeeman Effect-Paschen-Bach Effect-Influence of Nuclear Spin-Hyperfine Structure-Stark Effect-Rydberg Atoms-Lamb Shift-Characteristic X-Ray Spectra-Moseley's Law.

UNIT II Rotation of molecules

Classification of molecules – Interaction of radiation with rotating molecule – Rotational spectra of rigid Diatomic molecule – Isotope effect in Rotational spectra – Intensity of Rotational lines – Non-rigid rotator – Vibrational excitation effect – Linear polyatomic molecules – Symmetric top molecules - Asymmetric top molecules.

UNIT III Infrared spectroscopy

Introduction-Vibrational Energy of a Diatomic Molecule -Infrared Selection rules-Vibrating Diatomic Molecule-Diatomic Vibrating Rotator-Asymmetry of Rotation-Vibration Band- rotation – Vibrations of polyatomic molecules - More about anharmonicity - Fermi Resonance.

UNIT IV Raman spectroscopy

Introduction- Theory of Raman Scattering-Classical theory - Quantum theory of Raman scattering - Rotational Raman Spectra- Vibrational Raman Spectra-Mutual Exclusion Principle -Raman Microscopy.

UNIT V Electronic spectra of Diatomic molecules

Introduction –Vibrational Coarse Structure- Franck-Condon Principle- Intensity of Vibrational Electronic Spectra- Rotational Fine Structure of Electronic- Vibration Spectra- Photoelectron Spectroscopy.

Text Book:

Aruldas G., *Molecular Structure and Spectroscopy*, Prentice Hall India Learning Private Limited, New Delhi, Second Edition, 2011.

Unit I	Chapter	3.9, 3.12-3.20
Unit II	Chapter	6.1-6.10
Unit III	Chapter	7.1, 7.3-7.9
Unit IV	Chapter	8.1-8.5, 8.17
Unit V	Chapter	9.1, 9.2, 9.6, 9.7, 9.12

Reference Books:

- 1.Aravamudhan M. N, *An Introduction to Laser Theory and application*, S.Chand & Co.
- 2.Ajoy Ghatak, Thyagarajan. K, *Optoelectronics*, Cambridge University Press, India Pvt Ltd., New Delhi, First edition, Reprint 2011.
- 3.Banwell, Tata Mcgraw Hill, *Fundamentals of molecular Spectroscopy*, New Delhi.
- 4.Rajappan Nair. K. P, *Atomic Spectroscopy*, MJP Publishers, Chennai, 1st edition, 2012.
- 5.Wilfred Sugumar.R, *Molecular and Atomic Spectroscopy*, MJP Publishers, Chennai, 1st edition, 2008.

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Title of the Paper	: Theoretical Physics		
Semester	: VI	Contact Hours	: 4
Subject Code	: 21PE6A	Credits	: 4

Objectives:

To familiarize the students with

1. Basic concept of quantum idea.
2. Dual nature of microscopic particles.
3. Theory of relativity and its consequences.

Unit-I Classical Mechanics

Conservative Forces-Conservation theorem for energy of a particle-Mechanics of a system of particles-Degrees of Freedom – Constraints- Types of Constraints -Generalized coordinates- Transformation Equations - D'Alembert's Principles-Lagrangian Functions-Lagrange's Equation of Motion - Derivation of Lagrange's Equation of Motion -Application of Lagrange's Equation- Simple Pendulum – Compound Pendulum - The Atwood's Machine - The Hamiltonian Function H -Hamiltonian equation with derivation.

Unit-II Statistical Mechanics

Microscopic and Macroscopic descriptions-Ensembles- Phase space-Micro and Macro states- Thermodynamic probability- Boltzmann's theorem on entropy and probability –Derive the Boltzmann relation connecting entropy and Probability-Fundamental postulates of statistical mechanics-Maxwell-Boltzmann distribution law-Application of Maxwell-Boltzmann distribution law to an ideal gas-Maxwell-Boltzmann velocity distribution law.

Unit-III Quantum Statistics of particles

Introduction-Quantum statistics of identical particles - Bose-Einstein distribution law-Application of B.E Statistics- Planck's law of radiation-deduction-Wien's and Rayleigh-Jean's

law-Fermi Dirac Distribution Law – Application of Fermi Dirac Statistics-Comparison of three statistics.

Unit-IV Wave Mechanics

Introduction- The De-Broglie wavelength- Davisson and Germer's Experiment- G.P.Thomson's experiment- Wave velocity of De-Broglie waves- Group velocity of De-Broglie waves- Expression for Group velocity- Relation between group velocity and wave velocity-Heisenberg's Uncertainty principle.

Unit-V Relativity

Frames of reference-Galilean transformation equation-Michelson Morley experiment- Postulates of Special theory of Relativity-Lorentz transformation equations-Derivation of the Lorentz transformation equations - Einstein's Mass- Energy Relation- Relation between the total energy, rest energy and the Momentum.

Text book:

1. R. Murugesan, *Theoretical physics*, First Edition, S.Chand & Company, New Delhi, 2004.

Unit: I Chapters 1.1-1.8, 1.14-1.20, 1.24-1.26

Unit: II Chapters 2.1-2.2,2.4-2.9,2.11,2.12

Unit: III Chapters 2.13-2.24

Unit: IV Chapters 3.9, 3.10, 3.12-3.18

Unit: V Chapters 4.1-4.6, 4.11, 4.12

Reference Books:

1. Beiser, Shobhit Mahajan, S.Rai Choudhury, *Concepts of Modern Physics*, Tata MC Graw Hill Education Private Limited, New Delhi, Sixth Edition, 2012.
2. Herbert Goldstein, *Classical Mechanics*, Narosa Publishing house Pvt Ltd, New Delhi, Second Edition, 2001.
3. Murray R.Spiegel, *Theory and Problems of Theoretical Mechanics*, Tata MC Graw Hill Education Private Limited, Sixth Edition, New Delhi, 2012.
4. Panat .P.V, *Thermodynamics and Statistical Mechanics*, Narosa Publishing house Pvt Ltd, New Delhi, Second Edition, 2011.
5. Thankappan .V.K, *Quantum Mechanics*, New Age International (P) Ltd, New Delhi, Second Edition, 2012.

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.**(An Autonomous Institution – Affiliated to Madurai Kamaraj University)****(Re-accredited (3rd Cycle) with Grade A⁺ and CGPA 3.51 by NAAC)****CBCS****DEPARTMENT OF PHYSICS-UG****(w.e.f. 2021-2022 onwards)****Elective- II****Title of the Paper: Applications of Electronic Devices and Instrumentation****Semester : VI****Contact Hours : 4****Subject Code : 21PE6B****Credits : 4****Objectives:**

To expose the student to

1. Electronic Instrumentation of Various measuring instruments.
2. Working and types of various electronic meters.

Unit-I Electronic Instruments

Electronic instruments- Multimeter- Applications of Multimeter- Sensitivity of multimeter- Merits and Demerits of multimeter- Meter protection- Electronic Voltmeters - Vacuum tube voltmeter (VTVM)- Applications of VTVM- Merits and Demerits of VTVM- Cathode Ray Oscilloscope-Cathode Ray Tube- Deflection sensitivity of CRT- Various control of CRO- Applications of CRO.

Unit- II Recorders

Introduction- Strip Chart Recorder- Galvanometer Type Recorder-Circular chart Recorder- X-Y Recorder- Magnetic Recorders- Frequency Modulation (FM) recording - Digital data recording.

Unit -III Silicon Controlled Rectifier

Introduction -Silicon Controlled Rectifier (SCR) - Working of SCR- Equivalent circuit of SCR- Important terms- V-I characteristics of SCR- Applications of SCR- SCR as Static contactor – SCR for power control - Light activated SCR.

Unit –IV Power electronics

Introduction -Power electronics- The Triac- Triac Construction- Triac Operation-Triac Characteristics-Applications of Triac- The Diac-Application of diac-Uni-junction Transistor (UJT) - Equivalent circuit of a UJT-Characteristics of UJT- Advantages of UJT- Applications of UJT – UJT relaxation oscillator.

Unit- V Integrated circuits

Introduction-Integrated circuit- advantages and disadvantages of integrated circuits- IC classifications- Fabrication of components on monolithic IC- Simple monolithic IC's- IC packings-IC symbols- Scale of integration- Some circuits using ICs- OP Amp: Inverting and Non- inverting – Voltage follower – OP-Amp Integrators and Differentiators.

Text Books:

1. Mehta, Rohit Mehta V.K., *Principles of electronics*, 2013, S. Chand & co Limited, Ram Nagar, New Delhi, Eleventh Edition, 2008 [UNIT -I,III,IV,V]
2. Kalsi .H.S, *Electronic Instrumentation*, Tata Mc Graw-Hill Publishing Company Limited, New Delhi, Third Edition, 2003. [UNIT -II]

Unit: I Chapter 22.1 – 22.10, 22.13-22.15, 22.19, 22.20

Unit: II Chapter 12.1 – 12.3, 12.5 – 12.9

Unit: III Chapter 20.1 – 20.5, 20.12, 20.13

Unit: IV Chapter 21.1-21.3, 21.5, 21.6, 21.8-21.15

Unit: V Chapter 23.1, 23.2, 23.4, 23.6-23.11, 25.15, 25.24, 25.26, 25.27, 25.34

Reference Books:

1. Albert D. Helfrick, William D.cooper, *Modern Electronic Instrumentation and Measurement techniques*, PHI Learning Private Limited, New Delhi, Third Edition, 2011.
2. Basudev Ghosh, *Fundamental Principles of Electronics*, Books and Allied (p) Ltd, Kolkata, Second Edition, 2011.
3. Jose Robin .G, Ubald Raj .A, *Basic Electronics and Applied Electronics*, Indira Publication, Martha dam, Sixth Edition, 2004.
4. Prithwiraj Purkait, Budhaditya Biswas, Santanu Das, Chiranjib Koley, *Electrical and Electronics Measurements and Instrumentation*, PHI Learning Private Limited, New Delhi, Third Edition, 2013.
5. Rangan C.S, Sarma G.R, Mani .VSV, *Instrumentation Devices & systems*, Tata McGraw-Hill Education, Private Limited, New Delhi, Second Edition, 2012.

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CBCS

DEPARTMENT OF PHYSICS-UG

(w.e.f. 2021-2022 onwards)

Title of the Paper : Introduction to Microcontrollers 8051**Semester : VI****Contact Hours: 2****Subject Code : 21SEP61****Credits: 2****Objectives:**

1. To understand the basics of Microcontroller and Microprocessor.
2. To obtain the knowledge about the usage of registers in MCS-51.
3. To study the different types of Memory used in 8051 Microcontroller.
4. To acquire the knowledge about the assembly language programme tools.

Unit: I**Introduction to Microcontrollers**

Introduction – Microcontrollers and Microprocessors– History of Microcontrollers and Microprocessors – Embedded Versus External Memory Devices- 8-bit and 16-bit Microcontrollers-CISC and RISC and Processors- Harvard and Von Neumann Architectures- Commercial Microcontroller Devices .

Unit: II**8051 Microcontrollers**

Introduction- MCS -51 Architecture -Registers in MCS-51- General-purpose or working Registers – Stack pointer and program counter – Special Function Registers (SFR).

Unit:III**8051 Pin Description, Connections, I/O Ports and Memory Organization**

8051 Pin Description-8051 Connections -8051 Parallel I/O Ports-Memory Organization.

Unit:IV**MCS-51 Addressing Modes and Instructions**

8051 Addressing Modes- MCS-51 Instruction Set-8051 Instructions and Simple Programs- Using Stack Pointer.

Unit:V**8051 Assembly Language Programming Tools**

8051 Assembly Language Programming – 8051 assembler – 8051 programming Template - Development Systems and Tools – Software Simulators of 8051.

Text Book:

1. Ajay V Deshmukh, *Microcontrollers [Theory and Applications]*, Tata McGraw Hill Education Private Limited, New Delhi, Fifth Edition, 2010.

Unit:I	Chapters	1.1-1.8
Unit: II	Chapters	2.1-2.3
Unit: III	Chapters	3.1-3.4
Unit: IV	Chapters	4.1-4.4
Unit : V	Chapters	5.1-5.3

Reference books :

1. Ramesh Gaonkar , *Microprocessor Architecture, Programming and Applications with the 8085*, PRI Penram International Publishing (India) Private limited, Mumbai, Fifth Edition, 1999.
2. Walter A. Triebel, Avtar Singh, *the 8085 and 8086 microprocessors*, Dorling Kindersley (India) private limited New Delhi, Fourth Edition, 2007
3. Ram B, *Fundamentals of microprocessors & microcontrollers*, Dhanapat Rai publications, New Delhi, Seventh Edition, 2011.
4. Nagoorkani A, *Microprocessors & microcontrollers*, Tata McGraw Hill, New Delhi, Second Edition, 2012.
5. Raphae Chung-weiphan, Scott Mackenzie, *The 8051 Micro controller*, Fourth Edition, Pearson education, New Delhi, 2008.

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.**(An Autonomous Institution – Affiliated to Madurai Kamaraj University)****(Re-accredited (3rd Cycle) with Grade A⁺ and CGPA 3.51 by NAAC)****CBCS****DEPARTMENT OF PHYSICS-UG****(w.e.f. 2021-2022 onwards)****Title of the Paper : Major Physics Practical-III****Semester : V-VI****Contact Hours : 3****Subject Code : 21P61P****Credits : 5****Any Twelve:**

1. LCR – Series resonance circuit.
2. LCR – Parallel resonance circuit.
3. Potentiometer – Resistance and specific resistance of the coil.
4. Spectrometer – Cauchy's constant.
5. Spectrometer – Hartmann's formula.
6. Spectrometer – Resolving power of a prism.
7. Potentiometer – E.M.F of the thermocouple.
8. C_1/C_2 – De sauty's bridge.
9. Impedence & power factor – LR circuit. Field along the axis of a solenoid –
determination of B & M.
10. B.G. – Absolute capacity of condenser.
11. Comparison of mutual inductance of the coil- spot galvanometer.
12. Program to perform Fibonacci series using C language.
13. Program to perform two dimensional sorting using C language.
14. Check odd or even number using inline function using C language.
15. Finding area of shapes using virtual function using C language.

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CBCS**DEPARTMENT OF PHYSICS-UG**

(w.e.f. 2021-2022 onwards)

Title of the Paper : Major Electronics Practical-IV

Semester : V-VI

Contact Hours: 3

Subject Code : 21P62P

Credits : 5

Any Twelve:

1. Zener diode – Voltage regulation.
2. Hartley's Oscillator – L determination.
3. Colpits Oscillator.
4. Bridge Rectifier – L.C and π filter circuit.
5. Voltage doubler.
6. Dual Power supply – IC 78 and IC 79 series.
7. Monostable multivibrator – IC 555.
8. Op-amp-IC741 – Differentiator and Integrator.
9. Op-amp-IC 741- Adder and Subtractor.
10. IC-Logic gates-Truth table of all fundamental gates Verification (AND, OR, NOT, NAND, NOR).
11. Three Bit D/A converter.
12. IC-Logic gates- De Morgan's Theorems.
13. AND, OR, NOT-Using discrete components.
14. BCD to Seven segment display.
15. Optoelectronic device- LED and Seven segment display.

E.M.G. YADAVA WOMENS COLLEGE, MADURAI -14.**(An Autonomous Institution - Affiliated to Madurai Kamaraj University)****Re –accredited (3rd cycle) with Grade A⁺ and CGPA 3.51 by NAAC****CBCS****DEPARTMENT OF PHYSICS-B.Sc****(w.e.f. 2021-2022 Batch onwards)****ANCILLARY PHYSICS (for B.Sc Chemistry)****Title of the Paper : Electricity and Electronics****Semester : V****Contact Hours : 4****Subject Code :21AP3****Credits : 4****Objectives:**

This paper aims to impart comprehensive knowledge among students in about

1. Electrostatics and Electricity
2. Some Fundamentals in Analog and Digital Electronics

Unit: I**Current , Resistance and Electrical Measurements**

Current and current density-Expression for current density-Equation of continuity-Ohm's law and electrical conductivity-Kirchhoff's laws-Application of Kirchhoff's laws to Whetstone's network-Sensitivity of Whetstone's bridge-Carey foster bridge-Potentiometer

Unit: II**Thermo-Electricity**

Seebeck effect- Laws of thermo e.m.f- Measurement of thermo-EMF using potentiometer- Peltier effect- Thomson effect-Thermodynamics of Thermocouple-Thermo electric diagrams

Unit : III**Semiconductor Physics**

Semiconductor-Intrinsic semiconductor-Extrinsic semiconductor-n type semiconductor-p type semiconductor-pn junction-properties of pn junction-Applying D.C.Voltage Across pn Junction or Biasing a pn Junction-Current flow in a forward biased pn junction-Volt ampere characteristics of pn junction.

Unit :IV**Transistor**

Transistor- Transistor action- Transistor symbols - Transistor connections- Common base connection- characteristics of Common base connection -Common emitter connection- characteristics of Common emitter connection -Common collector connection- Transistor load line analysis.

Unit : V**Logic gates**

Decimal to binary conversion-Binary to decimal conversion-Logic gates-three basic logic gates-OR gate-AND gate-NOT gate-Combination of basic logic gates- NAND Gate as a universal Gate- Boolean theorems- DeMorgans theorems

Text Books:

- 1.Murughesan .R, *Electricity and Magnetism*,Sixth Edition, S.Chand And Company Ltd, New Delhi,2006(UNIT-I,II)
- 2.Mehta V.K, Rohit Mehta Principles of electronics, Eleventh edition, S.Chand and Company Ltd,New ,Delhi 2012(UNIT-III,IV,V)

Unit I - Chapters 6.1-6.4,6.6,7.1,7.2

Unit II - Chapters 8.1-8.8

Unit III - Chapters 5.1,5.8-5.11,5.14-5.18

Unit IV - Chapters 8.1,8.4,8.5,8.7-8.10,8.12,8.13,8.17

Unit V - Chapters 26.5-26.8,26.10-26.16,26.21,26.22

Reference books:

- 1.Duggal B.D. &Chabra C.L *Fundamentals of Electricity and Magnetism* Built: Paperback & Hardbound 4th (Reprint), 2014 Edition.
2. Jose Robin .G, Ubald raj .A, *Analog electronics and Digital Electronics*, Indra Publications, Marthandam, 2008.
3. Theraja. B.L, *Basic Electronics solid State*, Fifth Edition, S.Chand And Company Ltd, New Delhi,2009.
4. Satya prakash, *Electricity and magnetism* 26th edition, Pragati Prakashan, meetur,2011.
5. VasudevaD.N, *Fundamentals of Magnetism and Electricity* ,Published by S.Chand& Company Ltd. Sultan Chand & Company (2011).

E.M.G. YADAVA WOMENS COLLEGE, MADURAI -14.**(An Autonomous Institution - Affiliated to Madurai Kamaraj University)****Re –accredited (3rd cycle) with Grade A⁺ and CGPA 3.51 by NAAC****CBCS****DEPARTMENT OF PHYSICS-B.Sc****(w.e.f. 2021-2022 Batch onwards)****Title of the Paper : Optics****Semester : VI****Subject Code : 21AP4****Contact Hours: 4****Credits : 4****Objectives:**

This paper aims to impart comprehensive knowledge among students in about

1. To get the basic idea about Geometrical optics and Dispersion of Light.
2. To attain the knowledge about the Interference and Diffraction of Light.
3. To import the basic concepts about LASER.

Unit: I Geometrical optics

Convex lens-Principal Focus and Focal Planes-Refraction through a thin lens-Dispersion of Light - Dispersion through a Prism-Cauchy's Formula- Achromatism in Prisms-Dispersion without Deviation-Direct vision Spectroscope- Spherical aberration in a lens-Chromatic aberration in a lens.

Unit: II Interference

Introduction- Theory of interference fringes - Colours of thin films - Newton's rings-Determination of wavelength of sodium light by Newton's rings –Determination of refractive index of a liquid by Newton's rings-Michelson's interferometer.

Unit: III Diffraction

Introduction-Fresnel's explanation of rectilinear propagation of light-Zone plate-Diffraction at a thin wire-Fraunhofer diffraction at a single slit-Fraunhofer diffraction at a double slit-Resolving power of telescope-Resolving power of prism-Resolving power of a plane diffraction grating

Unit: IV Polarisation

Introduction-Polarisation of Light-Polarisation by reflection-Pile of plates-Law of Malus-Double refraction- Huygen's theory of double refraction in uniaxial crystals-Huygen's

construction for double refraction in uniaxial crystals- Nicol prism - Quarter wave plate-Half wave plate.

Unit: V LASER

The Einstein Coefficients –Relation between Einstein's A and B coefficients- Population Inversion – The Line shape function – Carbon Dioxide Laser – Dye Laser – Nd: YAG Laser – Resonators – The Quality Factor Q -Properties of Laser Beam – Monochromaticity – Directionality.

Text Books:

1. Murugesan.R, Kiruthigasiva Prakash, *Optics And Spectroscopy*, S.Chand & Company Ltd , New Delhi , first edition , Reprint 2013

UNIT I : Chapter 1.1-1.3, 1.7-1.11, 1.16, 1.20

UNIT II : Chapter 2.1,2.2, 2.5,2.8- 2.11

UNIT III : Chapter 3.1-3.3, 3.9-3.11,3.20,3.23,3.24

UNIT IV : Chapter 4.1-4.8, 4.12,4.13

UNIT V : Chapter 12.1,12.2,12.3,12.4,12.5, 23.1,23.4,23.7,23.8,23.9

Reference books:

1.Ajoy Ghatak, *Optics*, 5th edition, Tata McGraw Hill Education Private Limited, New Delhi,2012.

2.Feynman.R, Leighton.R.B and Sands.M- *The Feynman Lectures on Physics*, Vol II Pearson education 2013

3.Halliday.D, Resnick .R and Krane-*Physics volume II*- Wiley India (p)Ltd,New delhi,fifth edition.

4. KhannaDr.H.RGulati.R,*Optics*, Chand & Co, New Delhi, 1979

5. Subrahmanyam Brijlal.N,Avadhanulu.M.N, *Optics*, S.Chand& company Ltd,New Delhi, Twenty Fifth Edition 2012

E.M.G. YADAVA WOMENS COLLEGE, MADURAI -14.**(An Autonomous Institution - Affiliated to Madurai Kamaraj University)****Re –accredited (3rd cycle) with Grade A⁺ and CGPA 3.51 by NAAC****CBCS****DEPARTMENT OF PHYSICS-B.Sc****(w.e.f. 2021-2022 Batch onwards)****Title of the Paper : Allied Physics practical-II****Semester :V&VI****Contact Hours: 2****Subject Code : 21AP4P****Credits : 1****Any Twelve:**

1. Mirror galvanometer-voltage and current sensitiveness
2. Series resonance -LCR
3. Air wedge- thickness of wire
4. Dispersive power of a prism –spectrometer
5. Grating- normal incidence-spectrometer
6. Newton's rings determination of radius of curvature
7. Logic gates –AND,OR,NOT,-using discrete components
8. Logic gates-NAND,NOR-using discrete components
9. Verification of De Morgan's theorem using IC's
10. Diode characteristics
11. Zener diode characteristics
12. OP-amp as an adder
13. OP-amp as a subtractor
14. Parallel resonance – LCR
15. Half adder using logic gates Ic's
16. Half subtractor using logic gates Ic's

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CBCS**DEPARTMENT OF PHYSICS-UG**

(w.e.f. 2021-2022 onwards)

Elective –III Project

Title of the Paper : Project

Semester : VI

Contact Hours: 2

Subject Code : 21PPR6

Credits : 3

Students have to carry out Project Works under the guidance of the members of the Physics Department during V and VI semester 2 hours per week. PROJECT Work may be chosen in any field in Physics. Each batch will complete the project work in the month of February and submit their report in March. It will be duly signed by the project guide and the HOD of Physics. It will be evaluated 80 marks for external examiner and 20 marks for internal examiner. The viva on project work will be conducted during the Practical Examination at the end of VI semester. The viva on project will be conducted jointly by Guide, External Examiner HOD and the members of staff.