MASTER OF SCIENCES

M.Sc. - PHYSICS

SYLLABUS & REGULATIONS
WITH EFFECT FROM 2025-2026

P.G. Degree Programme(CBCS) Regulations-2016

Amended as per NEP-2020&CHOICE BASED CREDIT SYSTEM (CBCS)

CENTRE FOR DISTANCE AND ONLINE EDUCATION (CDOE)

SRI VENKATESWARA UNIVERSITY

Accredited by **"NAAC"** with "A^+ Grade

Tirupati, Andhra Pradesh - 517502

CENTRE FOR DISTANCE AND ONLINE EDUCATION (CDOE)

SRI VENKATESWARA UNIVERSITY : : TIRUPATI

SVU COLLEGE OF SCIENCES

MASTER OF SCIENCES

P.G. Degree Programme (CBCS) Regulations-2016

Amended as per NEP-2020

(with effect from the batch admitted in the academic year 2025-26)

CHOICE BASED CREDIT SYSTEM (CBCS)

DEPARTMENT OF PHYSICS
TWO YEAR M.Sc. COURSE IN PHYSICS (2024-25)
COURSE STRUCTURE AND EXAMINATION SCHEME

Semester -I

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**Mandatory Core**	PHY 101	Classical and Statistical Mechanics	6	4	30	70	100
2.		PHY102	Atomic Physics and Optics	6	4	30	70	100
3.	**Compulsory Foundation**	PHY103	Condensed Matter Physics	6	4	30	70	100
4.	**Elective Foundation**	PHY104	Mathematical Physics	6	4	30	70	100
5.	**Practical -I**	PHY 105	Paper 1 (General Lab)	6	4	--	100	100
6.	**Practical-II**	PHY 106	Paper 2& 3 (Electronics Lab)	6	4	--	100	100
	Total			36	24	120	480	600
7.	Audit Course			0	0	100	0	0

*All core papers are Mandatory.

- Compulsory Foundation choose onepaper.
- Elective Foundation – Choose onepaper.
- Audit course-100 Marks (Internals) Zero Credits underself-study.
- Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extracredits.

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SEMESTER-II

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**Mandatory Core**	PHY201	Quantum Mechanics	6	4	30	70	100
2.		PHY202	Nuclear Physics and Molecular Spectrocopy	6	4	30	70	100
3.	**Compulsory Foundation**	PHY 203	Numerical Techniques & Computer Programming	6	4	30	70	100
4.	**Elective Foundation**	PHY 204	Electronic Devices and Circuits	6	4	30	70	100
5.	**Practical -I**	PHY205	Paper 1& 3 (General Lab)	6	4	--	100	100
6.	**Practical-II**	PHY206	Paper 3 & 4 (Electronics Lab)	6	4	--	100	100
	Total			36	24	120	480	600
7.	Audit Course			0	0	100	0	0

*All core papers are Mandatory

- Compulsory Foundation chooseonepaper.
- Elective Foundation – Choose onepaper.
- Audit course-100 Marks (Internals) Zero Credits underself-study.
- Interested students may register for MOOC with the approval of the concerned DDC but it will be considered for the award of the grade as open elective only giving extracredits.

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SEMESTER-III

S.No	Components of Study	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**Mandatory Core**	PHY301	Digital Electronics, Microprocessors and Communication Electronics	6	4	30	70	100
2.		PHY302	VLSI design	6	4	30	70	100
3.	**Generic Elective**	PHY 303(a)	1.Applied Spectroscopy	6	4	30	70	100
		PHY 303(b)	2. Embedded Systems					
4.	**Practicals**	PHY 304	Special Lab	6	4	--	--	100
5.	**Skill Oriented Course**	PHY305	Electromagnetic Theory	6	4	10	90 (40+50)	100
6.	**Open Elective**	PHY 306(a)	1. Basic Spectroscopic Techniques	6	4	30	70	100
		PHY 306(b)	2.Nanomaterials and Devices					
	Total			36	24	130	370	600

*All core papers are Mandatory

- Generic Elective – Choosetwo
- Core papers and Generic Electives opted paper heldPractical-I
- Skill Oriented Course is Mandatory. Relevant society along with practical(10marks internal 40 final theory & 50 forpractical's).
- Open Electives are for the students of other Departments. Minimum one paper shouldbe opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student throughself-study.
- Interested students may register for MOOC with the approval of the concernedDDC.

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SEMESTER-IV

S.No	Components of study	Title of the Course	Title of the Paper	Credit Hrs/ Week	No. of Credits	IA Marks	Sem End Marks	Total
1.	**Mandatory Core**	PHY401	1.Advanced Quantum Mechanics	6	4	30	70	100
2.		PHY402	Physics of Advanced Materials	6	4	30	70	100
3.	**Generic Elective**	PHY 403(a)	1.Photonics	6	4	30	70	100
		PHY403(b)	2.Solar Energy-Thermal and Photovoltaic Properties					
		PHY403(c)	3.Vacuum and Thin Film Technology					
4.	**Practical's**	PHY404	Elective Lab	6	4	--	--	100
5.	**Multi Disciplinary Course/ Project Work**	PHY405	Advanced Characterizaton Techniques	6	4	--	--	100
6.	**Open Elective**	PHY 406(a)	1.Wireless Communications	6	4	30	70	100
		PHY406(b)	2. Vacuum Technology & Applications					
	Total			36	24	120	280	600

*All core papers are Mandatory

- Generic Elective – Choose one
- Core papers and Generic Electives opted paper heldPractical-II.
- Project Work- Collaboration with variousfirms/companies/societies.
- Multi-Disciplinary Course is Mandatory. Circle formation with other subjects/Dept.of Arts/Commerce.
- Open Electives are for the students of other Departments. Minimum one paper should be opted. Extra credits may be earned by opting for more number of open electives depending on the interest of the student through self-study.
- Interested students may register for MOOC with the approval of the concernedDDC.

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SEMESTER–I

PHY 101: CLASSICAL AND STATISTICAL MECHANICS

UNIT -I: LAGRANGIAN MECHANICS

Mechanics of a particle and system of particles, Conservation laws, Constraints and their classifications, Generalized coordinates, Principle of virtual work, D'Alembert's principle. Lagrange's equations: Lagrange's equations from D'Alembert's principle, Simple applications of Lagrange's equation: Linear Harmonic Oscillatory, Simple pendulum

HAMILTON'S PRINCIPLE

Hamilton's principle, Lagrange's equation from Hamilton's Principle, Extension of Hamilton's principles, Deduction of Lagrange's equation from Extended Hamilton's Principle.

UNIT - II: HAMILTONIAN MECHANICS

Legendre transformations, Generalized momentum and cyclic coordinates, Conservation theorems, Hamiltonian function, Hamiltonian equations of motion, Physical significance of Hamiltonian, Application of Hamiltonian Formulation: Linear Harmonic Oscillator, Simple pendulum

CANONICAL TRANSFORMATIONS

Equation of Canonical Transformations, Generating functions, Examples of canonical transformations: the harmonic oscillator, 'Poisson and Lagrange brackets, Equations of motion in terms of Poisson brackets, Relationship between Angular momentum and Poisson brackets.

UNIT - III: HAMILTON-JACOBI THEORY

Hamilton-Jacobi equation, one dimensional harmonic oscillator, Physical significance of the Hamilton's characteristic function.

ENSEMBLES

Basic postulates of Statistical Mechanics, Phase space, probability, Density distribution in phase space, Liouville's theorem, Concept of Ensemble, Classification of Ensemble: Micro canonical, Canonical and Grand Canonical ensembles.

UNIT - IV: PARTITION FUNCTION

Partition functions for Micro canonical, Canonical and Grand canonical ensembles, Boltzmanequipartition theorem, Partition functions for Translational, Rotational, Vibrational and Electronic energies. Maxwell - Boltzman statistics, Maxwell-Boltzman distribution of velocities.

QUANTUM STATISTICS

Bose-Einstein statistics and its distribution: Bose-Einstein condensation, Thermodynamic properties of an ideal Bose-Einstein gas, Black body radiation, Femi-Dirac statistics: Fermi-Dirac distribution.

BOOKS FOR STUDY

1. Classical Mechanics, J.C.Upadhyaya, Himalaya Publication house, Mumbai, 2005.
2. Classical Mechanics, H. Goldstein, Narosa Publications, New Delhi, 2001.
3. Classical Mechanics, SathyaPrakash, PragathiPrakashan Publications, Meerut, 2007.
4. Statistical Mechanics,B.K. Agarwal and M. Eisner, New International (P) Ltd., New Delhi, 2007.
5. Classical Mechanics, Gupta, Kumar and Sharma, PragathiPrakashan Publication, Meerut, 2005.
6. Elementary Statistical Mechanism, Gupta and Kumar, PragathiPrakasham, 1989.

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SEMESTER–I

PHY 102: **ATOMIC PYSICS and OPTICS**

UNIT-1: MANY ELECTRON ATOMS AND EXTERNAL FIELDS

Interaction energy and Spectral series of helium-Pauli's principle- LS coupling and Hand's rules, Lande's interval rule- Quantum theory of Zeeman and Paschen-Back effects- Distinguish between Normal Zeeman effect and Paschen-Back effects.

ATOMIC ABSORPTION SPECTROSCOPY

Principle of Atomic Absorption Spectroscopy(AAS). Instrumentation- Atomic absorption spectrometers- Differences between atomic absorption and flame emission spectroscopy.Determination of lead in petrol.

UNIT- II: EMISSION SPECTROSCOPY

Line spectra of atoms and ions- Excitation and ionization potentials- Sample preparation: rocks and biological samples. Spectrographs : prism and grating spectrographs. Qualitative analysis: Raies-Ultimes lines. Quantitative analysis: Internal standard method.

UNIT-III: LASERS

Einstein coefficients.Amplification in a medium and population inversion.Spatial and temporal coherence. The ruby laser, Helium-Neon laser, four level solid state laser. CO_2 laser, Dye laser, semiconductor laser.

HOLOGRAPHY

Introduction to Holography: Basic theory of Holography , Recording and reconstruction of Hologram, Fourier transform Holography, Acoustic and Holographic Microscopy, Pattern recognition and Applications of Holography.

UNIT-IV: FOURIER OPTICS

Fringe contrast variation.Fourier Transformation spectroscopy.Michelson interferometer.Advantages of Fourier transforms. Optical data processing. Diffraction.1

FIBRE OPTICS

Optical fibres.Basic optical laws.Optical fibre modes, fibre types, rays and modes. Distinction between step index fibre and graded index fibre structures. Ray optics and wave representation. Attenuation in fibres.Absorption & scattering losses, radiation losses.Material dispersion.Fibre materials.Applications of fibre optics.

BOOKS FOR STUDY

1. Classical Electrodynamics, J.D. Jackson, wiley, New York, 2001.
2. Fibre Optic Communication, Keiser, Mc. Graw Hill, New York, 2003.
3. Introduction to Classical and Modern Optics, J.R. Meyer, Prentice Hall, Englewood, Cliffs, New Jersy,1972.
4. Lasers and Non Linear Optics, B.B. Laud, New Age International Publishers, 2008.
5. Contemporary Optics, Ghatak and Thyagarajan, Plenum Press, New York, 2002.
6. Introduction to Modern Optics, Grant R. Fowles, Holt, Rinehart and Winston, Inc., New York, 1968.

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SEMESTER–I

PHY 103 :Condensed Matter Physics

UNIT-I: STRUCTURE OF CRYSTALS

Crystal systems, Bravias lattices, Miller indices, Relation between inter-planar spacing and lattice spacing, Reciprocal lattice and structural factorX-ray diffraction, Laue diffraction, Bragg's law. Powder diffraction-Experimental determination of structure of cubic crystals by powder diffraction technique-Bonding in crystals-Ionic, Covalent, and metallic Binding energy of ionic crystals

UNIT-II: TRANSPORT PHENOMENA AND BAND THEORY

Classical free electron theory, Expression for thermal nd electrical conductivities for metals, Lorentz number, Different scattering mechanisms- Mathieissen's rule, formulation of Boltzmann transport equation,Relaxation time approximation, Sommerfeld model-its consequences. Electron-lattice interaction(Quantitative only), Motion of electron in periodic potential, Bloch function, Kronig-Penny model, Formation of energy bands in solids, Concept of effective mass, Brillouion zones.

UNIT-III: IMPERFECTIONS IN CRYSTALS

Classification of imperfections- Point defects-Schottky and Frenkel defects-Expressions for equilibrium defect concentrations-Diffusion-Ionic conductivity in alkali halides-Kirkendall effect-Line defects-Dislocations-Edge and Screw dislocations-Estimation of dislocation densities-Role of dislocations in crystal growth-Frank-Reed mechanism of dislocation multiplication.

UNIT-IV: SUPERCONDUCTIVITY

Concept of zero resistance, Magnetic behavior, distinction between a perfect conductor and superconductor, Meissner effect-isotope effect-specific heat behavior, Two-fluid model.Expression for entropy difference between normal and superconducting states.London's equations-Penetration depth, BCS theory, Applications of superconductor-High T_c superconductors (Basics only).

BOOKS FOR STUDY

1. SolidState Physics, C.Kittel, Wiley Publishers, 8th Edition, 2004.
2. Solid state Physics, A.J.Dekker, Macmillan India Ltd., 2000.
3. Elementary SolidState Physics, M.Ali Omar, Pearson Education, 2002.
4. High T_c Superconductivity, C.N.R.Rao and S.V.Subramanyam, World Scientific Publishing Co. Pvt. Ltd, 1991.
5. X-ray Diffraction, B.E.Warren, Addison Wesley, 1962.
6. Electronic Devices and Circuit theory, Boylstead and Nashelsky, PHI, 2002.

7. Electronic Devices and Circuits: An Introduction, Alien Mottershead, PHI, 2011
8. Operational Amplifiers and Linear Integrated circuits, R.F.Coughlin andF.F.Driscoll, PHI, 2008.
9. An Introduction to Operational Amplifiers and their Applications, S.V.Subramanyam and Y.Narasimha Murthy, Mac Millan Publishers, 2010.

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SEMESTER–I

PHY 104 :MATHEMATICAL PHYSCIS

UNIT -1: TENSORS

Introduction: Notations and Conventions - The rank of a tensor –ContrA`-variant and Co-variant tensors - Tensor Algebra: addition, subtraction, contraction, inner product and outer product - Symmetric and anti-symmetric tensors - Applications of tensor: Stress, Strain, Piezo-electricity and elasticity tensors.

GROUP THEORY

Isomorphism and Homomorphism - The group of symmetry of an equilateral triangle -Group of symmetry of a square - Representation of groups: Reducible and Irreducible representations — Character representation — Construction of character tables (C_{2v}, C_{3v}).

UNIT-II: DIFFERENTIAL EQUATIONS

Bessel's differential equations: Bessel's function of first and second kind (recurrence formula, generating function and orthogonality relations only) - Legendre's equations -Laguerre and Hermite polynomials (recurrence formulae, generating function and Rodrigue's formulae only).

PARTIAL DIFFERENTIAL EQUATIONS

Method of separation of variables - Equation of vibrating string - Solution of wave equation by D'Alembert's method - One dimensional heat flow - Two dimensional heat flow - Laplace equation in polar co-ordinates - Transmission line equation.

UNIT-III : SPECIAL FUNCTIONS

Definitions of beta and gamma functions and their properties - Different forms of beta and gamma functions - Relationship between beta and gamma functions.

COMPLEX VARIABLES

Functions - Complex differentiation - Analytic function - Cauchy-Riemann equations -Derivatives of elementary function - Complex integration - Cauchy's theorem - Cauchy integral formula.

UNIT-IV: FOURIER TRANSFORMS

Fourier Transforms: Fourier transforms and its inverse transform - Linearity and shifting properties - Fourier sine and cosine transforms - Convolution theorem and Deconvolution theorem.

LAPLACE TRANSFORMS

Laplace Transform: Definition and notation - Inverse Laplace transforms - Linearity, shifting and derivative properties - Convolution theorem - Evaluation of Integrals -Application to Integral and differential equations.

BOOKS FOR STUDY

1. Matrices and Tensors, A.W. Joshi, New International (P) Ltd., New Delhi, 2008.
2. Elements of Group Theory for Physicists, A.W. Joshi, New International (P) Ltd., New Delhi
3. A Text book of Mathematical Physics, Suresh Chandra, Narosa Publishing house, New York
4. Mathematical Physics, H.K. Das, S.Chand& Company Ltd., New Delhi, 2005.
5. Special Functions, Bell.
6. Introduction to Mathematical Physics, Charlie Harper, PHI, New Delhi, 2004.
7. Mathematical Physics, Rajput, PragathiPrakasan, Meerut, 2001.

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SEMESTER–II

PHY 201: QUANTUM MECHANICS

UNIT-1: PRINCIPLES OF QUANTUM MECHANICS

Postulates of quantum mechanics-Operator formalism-Eigen values and Eigen vectors-Schrodinger equations: Development of the Schrodinger time independent and time dependent wave equations-Solution of the time dependent Schrodinger equation-Concept of stationary states.

ONE DIMENSIONAL PROBLEMS AND SOLUTIONS

Potential step - Reflection and Transmission at the interface. - Potential well: Square well potential with rigid walls - Square well potential with finite walls - Potential barrier: Penetration of a potential barrier (tunneling effect) - Radioactive emission of alpha particle. — Periodic potential - Harmonic oscillator.

UNIT- II: MATRIX FORMULATION

Matrix representation of wave functions - Linear operators - The concept of row and column matrices - Matrix algebra - Hermitian operators-Definition - Dirac's bra and ket notation - Expectation values - Heisenberg (operator) representation of harmonic oscillator - Ladder operators and their significance.

ANGULAR MOMENTUM

Angular momentum (AM) operators: Definition - Eigen functions and Eigen values of AM operators - Matrix representation of AM operators - System with spin half(l/2) -Spin angular momentum - Pauli's spin matrices - Clebsch-Gordon coefficients - Rigid Rotator.

UNIT-III : IDENTICAL PARTICLES AND MOLECULES

Identical Particles - Symmetric and anti-symmetric wave functions - Indistinguishability of identical particles - Pauli's exclusion principle - Hydrogen molecule ion - Hydrogen molecule - Concept of Ortho and Para Hydrogen.

APPROXIMATION METHODS

Time-independent perturbation method - Effect of anharmonicity on the solution of harmonic oscillator problem - Time-dependent perturbation theory - Fermi-Golden rule.

UNIT-IV :THEORY OF SCATTERING

The scattering experiment - The method of partial waves - Scattering by a central potential - Zero energy scattering - The Scattering length - Scattering by square-well potential - Effective range - Resonance scattering.

RELATIVISTIC QUANTUM MECHANICS

Klein-Gordon equation - Probability and current densities - Dirac matrices - Dirac relativistic equation for free particles - Concept of negative energy states - Theory of holes.

BOOKS FOR STUDY

1. Quantum Mechanics. Vol 1, A. MessaiaNoth-Holland Pub. Co., Amsterdam, 1961.
2. A Text Book of Quantum Mechanics, P.M.Mathews and K.Venkatesan, Tata Me Graw Hill
3. Introduction to Quantum Mechanics, R.H.Dicke and J.P.Witke, Addison-WisleyPub.Co.Inc., London, 1960.
4. Quantum Mechanics, S.L.Gupta, V.Kumar, H.V.Sarama and R.C.Sharma, JaiPrakashNath& Co, Meerut, 1996.
5. Quantum Mecanics, G. Aruldhas, Prentice Hall of India Pvt. Ltd, New Delhi 2002.
6. Introduction to Quantum Mechanics with applications to chemistry, Linus Pauling and E. Bright Wilson, Jr. McGraw Hill Book Company, New York, 1935.
7. Quantum Mechanics, L.I. Schiff, Me Graw Hill Book Co., Tokyo, 1968.
8. Quantum Mechanics. B.H. Bransden, CJoachain, Pearson Education Ltd., Second Edn., 2000.
9. Introduction to Quantum Mechanics, Richard L. Liboff, Pearson Education Ltd

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M.Sc. (Physics)

SEMESTER–II

PHY 202: Nuclear Physics and Molecular Spectroscopy

UNIT-I: INTRODUCTION TO NUCLEAR PHYSICS

Introduction to Nuclear properties-Radius, Mass, Packing fraction and binding energy, nuclear angular momentum, parity and symmetry, Magnetic dipole moment and electric quadrapole moment. Nuclear Two-Body problem: The Deuteron-Introduction, Simple theory of Deuteron, Spin dependence of Nuclear forces, Tensor forces. Meson theory of Nuclear forces.

NUCLEAR MODELS AND NUCLEAR REACTIONS

Introduction, the nuclear shell or independent particle model, The liquid drop model and semi-empirical binding energy formula, the collective nuclear model. Reaction Dynamics: Q-equation, Cross sections for nuclear reactions, the compound nucleus, compound nucleus formation and break-up, Stripping and Photo-nuclear reactions

UNIT-II: ELEMENTARY PARTICLES

Stable particles against decay through nuclear forces-parameters: Mass, particles and anti-particles, strangeness, decay times. Conservation laws: Conservation of Baryons, Conservation of Strangeness, Conservation of parity and isotopic spin, Stable particles: Mass-less Bosons, Leptons, Mesons, Baryons.

PARTICLE DETECTORS AND ACCELERATORS

Particle detectors: Gas filled detectors, Solid state detectors, Scintillation counter, Nuclear Emulsions. High energy particle detectors, Cerenkov detectors.Bubble chamber and Cloud chamber. Particle accelerators: Ion sources, Direct current accelerators, The cyclotron. The linear accelerators, Betatron.

UNIT -III : DIATOMIC MOLECULAR SPECTRA

Born-oppenheimer approximation, Rotational spectra, Vibrational spectra, Electronic spectra, Vibrational isotope effect, Potential curves, Dissociation energies, Franck-Condon principle.

INFRARED AND RAMAN SPECTROSCOPY

Theory of IR, IR double beam spectrometer, Vibrations of polyatomic molecules, Analysis of IR spectra of thymidine and Hydrocarbons.

Raman Spectroscopy: Classical and quantum theories of Raman Effect, Laser Raman spectrometer, Raman spectra of CO_2, N_2O, SO_2. Differences between IR and Raman, Advantages of Raman spectroscopy over IR.

UNIT - IV: BASICS OF NMR & ESR SPECTROSCOPY

Theory of ESR spectroscopy, Instrumentation, Hyperfine splitting, Application to ESR spectra of Mn^{2+} and Cu^{2+} ions.

Theory of NMR spectroscopy, Instrumentation, Chemical shift and its origin, Spin-lattice and spin-spin relaxation, Applications to CH_3CHO and C_2H_5OH .

BASICS OF NQR & MOSSBAUER SPECTROSCOPY

Theory of NQR spectroscopy, Instrumentation, Applications (brief details only): Structural information about group III halides, Charge transfer compounds. Recoil-less emission and absorption of γ rays, Mossbauer effect, Instrumentation, Applications to Mossbauer spectroscopy.

BOOKS FOR STUDY

1. Introduction to Nuclear Physics, Herald Enge, Addison-Wesely, NewYork, 1994.
2. The Fundamental Particle, C.E.Swartz, Addison-Wesely, London, 1987.
3. Nuclear Physics, Irving Kaplan, Oxford & IBH Co.New Delhi, 1991.
4. Atomic and Nuclear Physics, V.W. Kulkarni,Himalaya Publishing House, 2001.
5. Fundamentals of Molecular Spectroscopy, C.N. Banwell, Tata Me GrawBm, New Delhi, 1983.
6. Spectroscopy, B.P.Straughan and S. Walker, Vols. 1-3, Chapmann ad Hall, New York, 1976.
7. Molecular Structure and Spectroscopy, G. Aruldhas, Prentice-Hall of India, New Delhi, 2001.
8. Spectroscopy, Chatwal and Anand, Himalaya Publishing House, New Delhi, 2002.
9. Spectroscopy, H.Kaus, PragathiPrakashan, Meerut, 2008.
10. Spectroscopy, B.K. Sharma, Goel Publishing House, Meerut, 1998

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M.Sc. (Physics)

SEMESTER–II

PHY 203: **Numerical Techniques &Computer Programming**

UNIT -1: ROOTS OF EQUATION

Solution of algebraic and transcendental equations: Bisection method, Method of false position and Newton-Raphson method. Principle of least squares - fitting of polynomials.

INTERPOLATION

Definition of Interpolation- Finite difference operation (forward, backward and central difference), Newton forward difference interpolation formula, Newton backward difference interpolation formula, Gauss's Central difference Interpolation formula, Lagrange's Interpolation formula and Inverse Interpolation.

UNIT - II: NUMERICAL DIFFERENTIATION & INTEGRATION

Numerical Differentiation: Cubic Spline Method, Maximum and minimum values of a tabulated function. Numerical Integration: Trapezoidal Rule, Simpson's 1/3 Rule and 3/8 Rule.

MATRICES AND LINER SYSTEM OF EQUATIONS

Introductions - Basic definitions- Matrix operations- Transpose of a matrix. Inverse of a Matrix - Rank of amatrix. Solutions of linear systems- Direct methods: Matrix Inversion method, Gaussian Elimination method, Modification of Gaussian Elimination method(Gauss-Jordan Method). Iterative methods: Jacobi method, Gauss Seidel method.

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Introduction, Solution by Taylor's series, Picard's method of successive approximations, Euler's method. Modified Euler's method.Runge-Kutta method: Second order Runge-Kuttaformula, and Runge-Kutta fourth order formula.

UNIT - III: INTRODUCTION TO ‘C' LANGUAGE

Character Set, C tokens, Key words and Identifiers, Constants and Variables, Data types,Declaration of variables. Operators and expressions: Arithmetic, Relational, Logical,Assignment, Increment and Decrement operators, Conditional, Bitwise and Specialoperators. Precedence in evaluating arithmetic operators.Reading and Writing a character. IF, IF-ELSE, Nesting IF-ELSE, ELSE IF ladder and GOTO statements,WHILE, DO, FOR loop statements. Simple programs

UNIT - IV: PROGRAMMING IN 'C' LANGUAGE

Arrays: One and Two dimensional arrays, Declaring and initializing string variables. Reading strings from terminal and writing strings to screen.User defined functions: Definition of functions, Return values and their types. Function calls and function declaration. Pointers: Declaring and initializing pointers, Accessing a variable through its pointer. C- Programming: Linear regression, Sorting of numbers, Calculation of standard deviation and Matrix multiplication.

PROGRAMMING IN C -NUMERICAL METHODS

Bisection method, Method of false position and Newton-Raphson method.Numerical Integration: Trapezoidal Rule and Simpson's 1/3 Rule. Numerical solution of Differential equation: Runge-Kuuta method of order four.

BOOKS FOR STUDY

1. Introductory Methods of Numerical analysis, S.S.Sastry, Prentice Hall of India Pvt. Ltd.

2. Numerical Ananlysis, Bhupendra Singh, PragathiPrakasan, Meerut, 2010.

3. Mathematical Physics. H.K.Das, S.Chand& Co, New Delhi, 2005.

4. Programming in ANSI C, E. Balaguruswamy, TMH New Delhi, 2004.

5. Let us C, YashavantKanetker, BPB Publications, New Delhi, 1999.

CENTRE FOR DISTANCE AND ONLINE EDUCATION (CDOE)
SRI VENKATESWARA UNIVERSITY :: TIRUPATI
M.Sc. (Physics)
SEMESTER–II

PHY 204: Electronic Devices and Circuits

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Know the characteristics of various components.
2. Understand the utilization of components.
3. Understand the biasing techniques
4. Understand the utilization of special components.
5. Design and analyze small signal amplifier circuits.

Unit-I: Diode and Applications

Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times. Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

Unit-II: Bipolar Junction Transistor (BJT)

Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times, Transistor Biasing and Stabilization-Operating point, DC & AC load lines, Biasing-Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diodes.

Unit-III: Junction Field Effect Transistor (FET)

Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable Resistor. Special Purpose Devices: Zener Diode - Characteristics, Voltage Regulator. Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode.

Unit-IV: Analysis and Design of Small Signal low Frequency BJT Amplifiers

Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Transistor Hybrid model, Determination of h-parameters from transistor characteristics, Typical values of h- parameters in CE, CB and CC configurations, Transistor amplifying action, Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

FET Amplifiers

Small Signal Model, Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers. MOSFET Characteristics in Enhancement and Depletion mode, Basic Concepts of MOS Amplifiers.