

Govt. Nagarjuna PG College of Science, Raipur (CG)

CURRICULUM & SYLLABI

(Based on CBCS & LOCF)

B.Sc. Honours/Honours with Research (Physics)

Session: 2026-2027

Approved by:	Board of Studies	Academic Council
Date:		

B.Sc. Honours/ Honours with Research (Physics)
Semester – 7th (JUL-DEC-2026)
Paper – I (Course – D3C)
Mathematical Physics

Unit	Topics
I	1.1 Vector Spaces and Matrices linear independence Bases;
	1.2 Dimensionality; Inner product; linear transformations;
	1.3 Matrices; Inverse; Orthogonal and unitary matrices;
	1.4 Independent elements of a matrix; Eigen values and eigenvectors; Diagonalization; Complete orthonormal set of functions.
II	2.1 Special Functions; Solution by series expansion; Legendre Polynomial Generating function, recursion relations; Rodrique formula, orthogonal properties, Associated Legendre polynomials; Recurrence formulae and orthogonal properties,
	2.2 Laguerre Polynomial Generating function, recursion relations; Rodrique formula, orthogonal properties, Associated Laguerre differential equation and polynomial.
	2.3 Bessel's Differential equations, First and Second kind, Recurrence formulae and generating function for $J_n(x)$, Jacobi series Bessel's Integrals, orthonormality of Bessel's functions, spherical Bessel's function : Recurrence relation and orthogonality.
	2.4 Hermite Differential equation and polynomials, generating function, Recurrence relation, Rodrique formula, orthogonality.
III	3.1 Function of complex variables, limit ,continuity and differentiability, Analytic function, the necessary and sufficient condition for a function to be analytic,
	3.2 Cauchy-Riemann condition, Cauchy integral theorem, evaluation of line integral by indefinite integration, Cauchy integral formula,
	3.3 Derivative of an analytic function. Singularities of an analytic function
	3.4 Residues and their evaluation, Cauchy residue theorem, contour integration
IV	4.1 Integral Transforms, Laplace transform; First and second shifting theorems;
	4.2 Inverse LT by partial fractions; LT of derivative and integral of a function.
	4.3 Fourier series; FS or arbitrary period; Half-wave expansions; Partial sums; Fourier integral and transforms;
	4.4 Dirac delta function, three dimension delta function.

Signature of Members Board of Studies:

HOD : _____

External subject Experts: 1- _____ 2- _____ 3- _____

Departmental Members : 1- _____ 2- _____ 3- _____ 4- _____ 5- _____

6- _____ 7- _____ 8- _____ 9- _____

Student Members:

1- Aditi 2- Prakriti 3- Palak

B.Sc. Honours/ Honours with Research (Physics)
Semester – 7th (JUL-DEC-2026)
Paper – II (Course – DSE-1)
Classical Mechanics

Unit	Topics
I	1.1 Conservation Principles, Mechanics of a particle, conservation Principles for system of particles.
	1.2 Constrained motion, constraints and degrees of freedom, principle of virtual work, generalised coordinates, Generalised Notations (i) Generalised Displacement , velocity , Acceleration, momentum, force and potential , limitations of Newton's laws.
	1.3 D'Alembert's Principle, Lagrange's equation from D'Alembert's principle . Application of Lagrange's equation of motion (i) Linear Harmonic oscillator (ii) Simple pendulum (iii) spherical pendulum (iv) Isotropic oscillator (v) Atwood's Machine,
	1.4 conservation of linear momentum, angular momentum and energy in Lagrangian formulation, Lagrange's equation for nonholonomic system, procedure to eliminate consideration of Ignorable co ordinates the Routhian function.
II	2.1 Variational Principle, calculus of variation, some techniques of calculus of variables ,
	2.2 Euler Lagrange differential equation. Hamilton variational principle, Deduction of Hamilton's Principle from D'Alembert's principle, Deduction of Newton's second law of motion from Hamilton's Principle, Deduction of Lagrange's equations of motion from Hamilton's Principle for conservation and for non conservative systems,
	2.3 Non conservative forces, Dissipative system, Rayleigh's Dissipation function
	2.4 Lagrangian for a charged particle in an electromagnetic field.
III	3.1 Hamiltonian formulation of mechanics: Phase space and the motion of the system, Hamiltonian function, Hamilton's canonical equation of motion.
	3.2 Physical significance of H, Deduction of Canonical equation from variational principle, Hamilton's canonical equations of motion in different coordinate systems,
	3.3 Application of Hamilton equation of motion (i) Simple pendulum (ii) compound pendulum (iii) Two dimensional Isotropic Harmonic oscillator (iv) Linear Harmonic oscillator (v) Particle in central field of force.
	3.4 Hamiltonian for a charged particle in an electromagnetic field . Principle of least action statement and its proof.
IV	4.1 Canonical or constant transformation, its advantage example of canonical transformation, necessary and sufficient condition for a transformation to be canonical, Infinitesimal contact transformations,
	4.2 Hamilton-Jacobi partial differential equation for Hamilton's Principle function. Solution of Harmonic oscillator problem by Hamilton-Jacobi method. Hamilton- Jacoby theory.
	4.3 Poisson Bracket: Definition and properties. Invariance of Poisson-Brackets with respect to canonical transformation , Equations of motion in Poisson bracket form Jacoby identity. Infinitesimal contact transformations, interpretation in terms of Poisson Brackets.
	4.4 The angular momentum and Poisson Bracket, Lagrange's Brackets: definition & Properties , Relation with Poisson Brackets .

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B.Sc. Honours/ Honours with Research (Physics)
Semester – 7th (JUL-DEC-2026)
Paper – III (Course – DSE-2)
Basic Quantum Mechanics

Unit	Topics
I	1.1 Hertz experiment for particle nature of radiation, photoelectric effect and its explanation by plank's theory, Compton effect for particle nature of radiation, Davison - Germer experiment for wave nature of matter, interference experiment and uncertainty principle,
	1.2 Probabilistic interpretation of matter waves, exact proof of uncertainty principle, Schrodinger equation physical interpretation of wave function and probability current density, Continuity equation,
	1.3 Wave packet, time evolution of 1 D wave packet, group and phase velocities of a wave packet, Operators and their commutation relation, Ehrenfest theorem,
	1.4 Stationary state solution of Schrodinger equation, boundary and continuity condition, degeneracy, orthogonality of eigen function, parity Dirac delta function and completeness of eigen function, Gaussian wave packet.
II	2.1 Some exact solutions for schrodinger equation like: 1D infinite potential well, particle in a 3 D box, density of states and application to free electrons in a metal, rectangular potential barrier, periodic potential wells and barriers, Schrodinger picture,
	2.2 Bracket notation properties and some applications, Hilbert space, and representation of states, matrix representation of operators;
	2.3 Heisenberg picture, Interaction picture, Unitary transformation U, V, W,
	2.4 Linear harmonic oscillator problem using Bracket notation, Density Operators.
III	3.1 Angular momentum as infinitesimal rotation operator, Commutation relationship, Angular Momentum Operator and Spherical Harmonics,
	3.2 Eigen values and eigen functions of Angular Momentum using bracket notation,
	3.3 Concept of spin and Stern Gerlach experiment, Pauli's spin Matrices, Pauli's wave function and Pauli equation,
	3.4 Angular momentum matrices for $J=1$, Addition of Angular Momentum and Clebsch-Gordon coefficients, calculation of Clebsch-Gordon coefficients for $J_1=J_2=1/2$
IV	4.1 Central force problem: Solution of Schrodinger equation for spherically symmetric potentials; Hydrogen atom, center of mass frame, reduced mass, 3D
	4.2 Square well potential problem and eigen values and eigen function for hydrogen atom.
	4.3 Time-independent perturbation theory; Non-degenerate cases; First order Perturbation with the example of an Oscillator Degenerate cases,
	4.4 Applications of time independent perturbation theory such as Stark effect. Zeeman effect without electron spin, First order Stark Effect in Hydrogen

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B.Sc. Honours/ Honours with Research (Physics)
Semester – 7th (JUL-DEC-2026)
Paper – IV (Course – DSE-3)
(Electronic Devices)

Unit	Topics
I	1.1 Transistors : Bipolar Junction transistor (BJT) – basics working principle of NPN and PNP transistor, characteristic curve and different modes of transistor, current gain in different modes and relation between them.
	1.2 Junction Field Effect Transistor (FET) – N channel and P channel FET, Working principle, static and dynamic characteristic curves, pinched off voltage, Coefficient of FET, and relation between different coefficient.
	1.3 Metal Oxide Field Effect Transistor (MOSFET) – DE MOSFET and E-MOSFET-construction and working principle, static and dynamic characteristics.
	1.4 Uni-junction transistor (UJT) – basics structure, working principle, Voltage – Current characteristics and important parameters
II	2.1 MIS Diode : Introduction , Energy band diagram, accumulation, depletion and inversion condition concept of surface space charge, surface potential, surface capacitance, Ideal MIS curves
	2.2 Charged Couple Device (CCD) : Basic structure, working principle, charge transfer with clock voltage.
	2.3 IMPATT Diode : Introduction, Structure, Principle of operation, Static and Dynamic Characteristics.
	2.4 Microwave devices: Tunnel Diode Transfer Electron Devices: Transfer Electron Effect, Gun Diode, Backward Diode
III	3.1 Electro-Optic, Magneto-Optic and Acousto-Optic Effects. Material Properties related to get these effect.
	3.2 Important Ferro electric, Liquid Crystal and Ploymeric materials for these devices,
	3.3 Important materials exhibiting Electro-Optic, Magneto-Optic and Acousto-Optic properties, and their applications in sensors and actuator devices.
	3.4 Piezoelectric, Electrostrictive and magneto strictive Effects, Acoustic Delay lines, piezoelectiric resonators and filters.
IV	4.1 Modulation : Definition , Types of Modulation, Mathematical expression of modulation, Percentage of modulation, Amplitude modulation, Generation of Amplitude modulation,
	4.2 Demodulation, Demodulation of Amplitude modulated wave, side bands, band width, DSBSC modulation, Generation of DSBSC waves.
	4.3 SSB modulation, Generation and Detection of SSB waves,
	4.4 Multiplexing: Frequency division multiplexing (FDM)

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B.Sc. Honours/ Honours with Research (Physics)
Semester – 7th (JUL-DEC-2026)
Course-Research Methodology

Unit	Topics
1.1	Elements of Statistics : Definition, Branches: Descriptive vs. Inferential, Key terms: population, sample parameter, statistic
1.2	Types of Data : Qualitative vs Quantitative , Discrete vs Continuous variables, Levels of measurement: Nominal, Ordinal, Interval, Ratio
1.3	Data Collection Methods: Surveys, observational studies, and experiments, Sampling techniques: Random sampling, Stratified sampling, Cluster sampling, Systematic sampling
1.4	Introduction to Data Ethics: Confidentiality, Bias in data collection.
2.1	Organizing Data: Frequency tables, Grouped frequency distributions
2.2	Data Visualization: Bar charts, Histograms, Pie charts, Stem-and-leaf plots, Box plots
2.3	Descriptive Statistics: Measures of central tendency: Mean, Median, Mode, Measures of variability: Range, Variance, Standard Deviation
2.4	Using Technology: Entering and analyzing data using Excel or Google Sheets, Basic chart creation tools
3.1	X-ray diffraction: coherent scattering of X-rays, reflected intensities, experimental methods of crystallography, particle size determination.
3.2	Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Scanning Tunneling Microscopy (STM),
3.3	Atomic Force Microscopy (AFM), Fourier Transform Infrared (FTIR) and Raman spectroscopy
3.4	Nuclear Magnetic Resonance (NMR), Electron Spin Resonance (ESR).
4.1	Basic mechanisms of Photoluminescence (PL) :- Excitation & Emission spectra, radiative & non- radiative transition, up & down conversion
4.2	Measurement techniques to study Photoluminescence response,
4.3	Techniques for ML measurement,
4.4	TL measurement techniques- Basic TL apparatus, Heating system, Light detection, recording and display, TL glow curve, UV-visible spectrometry.

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5 _____ 6 _____ 7 _____ 8 _____ 9 _____

Student Members 1 Aditi 2 Prakrishi 3 Palak

B.Sc. Honours/ Honours with Research (Physics)

Semester – 8th (JAN-JUN-2027)

Paper – I (Course – DSC)

(ELECTRODYNAMICS)

Unit	Topics
I	1.1 Equation of continuity, Maxwell's equations (SI unit) and its derivation, Integral form of equation, Maxwell's equations in some particular cases: a) In Free space (b) In linear isotropic medium (c) for harmonically varying fields, Electromagnetic energy: Poynting Theorem, The wave equation..
	1.2 . Plane electromagnetic waves in free space. Plane electromagnetic waves in a non-conducting isotropic medium (i.e. Isotropic dielectrics)
	1.3 Plane electromagnetic waves in Anisotropic Non-conducting medium (Anisotropic dielectric), Plane electromagnetic waves in conducting medium 1) skin depth 2) Poynting vector.
	1.4 A simple model for dynamic conductivity. Propagation of electromagnetic waves in ionized gases.
II	2.1 Boundary conditions at the interface of two media, Reflection and Refraction of electromagnetic waves at the interface of Non-conducting media,
	2.2 Fresnel's equations :case- 1 E-vector is perpendicular to the plane of incidence,case-2 E-vector is parallel to the plane of incidence, experimental verification of Fresnel's equations.
	2.3 Reflection and transmission coefficients at the interface between two non conducting media, Brewster's law and degree of polarisation , Total internal reflection , Group velocity
	2.4 Propagation of Electromagnetic waves between parallel conducting planes. Wave guides: TM modes and TE modes, Rectangular wave guides
III	3.1 Postulates of Einstein's special theory of relativity, Galilean transformations. Lorentz's transformations and it's consequences: Length Contraction, Time Dilation, Velocity addition, Variation in mass. .
	3.2 Transformation of differential operator, Invariance of D'Alembertian operator, Invariance of charge, Transformation of charge density, Electric field measured in different frames of reference, Minkowski space,
	3.3 Concept of four vector, Lorentz transformation of space and time in four vector form, Transformation for charge and current density: Equation of continuity in covariant form, special case, Invariance of charge.
	3.4 Transformation of electromagnetic potential A and . Lorentz condition in covariant form, Covariance or invariance of Maxwell field equation in terms of four vectors
IV	4.1 Electromagnetic vector and scalar potential , Lorentz Gauge, Lienard Wiechart potentials,
	4.2 The electromagnetic field of a uniformly moving point charge, Radiation from an accelerated charge at low velocity – Larmer's formula
	4.3 Relativistic generalization of Larmer's formula, Angular distribution of radiation emitted by an accelerated charge, Radiation damping, The Abraham Lorentz formula, Cherenkov radiation
	4.4 Radiation due to an oscillating electric dipole, electric quadra pole radiation, Radiation due to small current element, Radiation from linear antenna, Half wave antenna, Antenna array: Work, Radiation, Pattern.

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Student Members:

1 _____ **2** _____ **3** _____

B.Sc. Honours/ Honours with Research (Physics)
Semester – 8th (JAN-JUN-2027)
Paper – II (Course – DSE-1)
(Computational Methods)

Unit	Topics
I	1.1 Problem analysis and solving scheme, Computational procedure, programming outline, flow chart. Branching and looping writing.
	1.2 Character set, constants, (numeric string) variables(numeric string) rules for arithmetic expressions and hierarchy of operators, rational expressions, logical expressions, and operators, library functions.
	1.3 Identifiers, qualifiers, define statements, value Initialized variables, operators, and expressions. Operator precedence and associativity.
	1.4 Scanf with specifier, search set arrangements and suppression Character, format specifier for scanf.
II	2.1 Control structure, If statement, if else statement, multiway decision, compound statement.
	2.2 Loops: for loop, while loop, do while loop, break statement , compound statement continue statement , go to statement
	2.3 Function: function main , function accepting more than one parameter, user defined and library function concept associatively with functions, function parameter, return value, recursion comparison.
	2.4 Arrays , strings, multidimensional array, array of strings function in string
III	3.1 Solution of algebraic and transcendental equations – Basic properties of equation, transformation of equation and rate of convergence.
	3.2 Methods –Bisection Method, Regula falsi method, Secant method, iteration method, Newton Raphson method, Muller's method.
	3.3 Solution of simultaneous linear equations Gaussian elimination pivoting, iterative method matrix inversion method, cramer's rule, Gauss-Jordan method.
	3.4 Eigen values and Eigen vectors of matrices. Power and Jacobi method , curve fitting polynomial least squares
IV	4.1 Finite difference interpolation with equally spaced and unequally spaced points,
	4.2 Numerical differentiation and Integration, Newton cote's quadrature formula
	4.3 Trapezoidal rule, simpson1/3 rule, simpson3/8 rule, Boole's rule, Weddle's rule
	4.4 Numerical solution of ordinary differential equation. Euler and Runge Kutta methods. Predictor corrector method

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B.Sc. Honours/ Honours with Research (Physics)
Semester – 8th (JAN-JUN-2027)
Paper – III (Course – DSE-2)
(ADVANCED QUANTUM MECHANICS)

Unit		Topics
I	1.1	Variational method, Ground state energy of H atom, Ground state energy of He atom, Ground state energy of 1D harmonic oscillator
	1.2	WKB method, Classically accessible & inaccessible region, Turning points, condition of validity of semi classical approximation, connection formula to join two WKB solutions at turning points,
	1.3	Sommerfeld quantization condition, Energy levels of potential well, quantization rule,
	1.4	Probability of penetration through potential barrier, tunneling through potential barrier, Theory of α decay.
II	2.1	Time dependent perturbation theory:-Basic Concept, Transition probability, harmonic perturbation, constant perturbation, Fermi's Golden rule,
	2.2	adiabatic approximation, sudden approximation, Semi classical theory of radiation:-The interaction of radiation with atomic system,
	2.3	Applications of time dependent perturbation theory, Transition probability for absorption and induced emission, Electric dipole transition,
	2.4	transition Probability, Einstein's A & B coefficients, selection rule, forbidden transition
III	3.1	Scattering, scattering amplitude scattering cross section, Laboratory & centre of mass frame, Techniques for calculating the scattering amplitude,
	3.2	Born approximation, Integral form of Schrodinger equation, First Born approximation, Born approximation for spherically symmetric potential, condition for validity of Born approximation,
	3.3	Applications of Born approximation:- screened coulomb potential, square well potential, Partial wave analysis:-Formalism & strategy,
	3.4	Optical theorem, phase shift, Applications of partial wave analysis, scattering by Perfectly rigid sphere and square well potential
IV	4.1	Identical particles : Physical meaning of identity, Symmetric & Anti symmetric wave function,
	4.2	Construction from unsymmetrized function, the Exclusion principle, spin angular momentum.
	4.3	Relativistic quantum mechanics:- Klein Gordon equation for free particle and for particle in electromagnetic field, continuity equation,
	4.4	Dirac equation for free particle, α and β matrices, charge and current densities, free particle solution, existence of spin and magnetic moment, theory of positron.

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Student Members:

1- Aditi 2- Pratik 3- Parak

B. Sc. Honours/ Honours with Research (PHYSICS)
SEMESTER – 8th (JAN. – JUN. 2027)
Dissertation/Project Work

Rules and Regulations

Project Work/ Dissertation will be compulsory for each student appearing at the B. Sc. Semester- VIII Examination.

(i)	Project work/ Dissertation shall carry 150 marks as follows-		
	Classification	Max Marks	Min. Marks
	Project work/ Dissertation	150	60
(ii)	Credits		
			10
(ii)	For Project work/ Dissertation work, the Method of allotment will be decided by the Department.		
(iii)	Three copies of Project work/ Dissertation (Printed or Type Written) shall be submitted to Department, at fifteen days prior to the date of commencement of Semester-VIII Examination, which will be retained by the Department for internal evaluation purpose.		
(iv)	A Candidate shall submit with his/her project work/ Dissertation, a certificate from the Supervisor to the effect- That the candidate has satisfactorily completed the Project work for not less than one semester and that the Project work/ Dissertation is the result of the candidates own work and is of sufficiently high standard to warrant its presentation for examination.		
(v)	Candidate shall submit his declaration that the Project work/ Dissertation is the result of his own research work and the same has not been previously submitted to any examination of this University or any other University. The Project shall be liable to be rejected and /or cancelled if found otherwise.		
(vi)	The students should submit review of their work.		
(vii)	The departmental project presentation before final exam should be organized.		
(viii)	The Project work shall be evaluated through seminar and open defense and Viva-voce at the Department by one External Examiner & One internal Examiner appointed by the College.		
(ix)	The percentage of passing in project work/ Dissertation will be governed as per semester rules.		

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HOD : _____

External subject Experts 1 _____ 2 _____ 3 _____

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Student Members 1 _____ 2 _____ 3 _____

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 External subject Experts: *[Signature]*
 Departmental Members: *[Signature]*, *[Signature]*, *[Signature]*
 Student Members: *[Signature]*, *[Signature]*, *[Signature]*

B.Sc. Honours/ Honours with Research (Physics)

Semester – 8th (JAN-JUN-2027)

Paper – IV (Course – DSE-3)

(Digital Electronics)

(qualifying)

Unit	Topics
I	1.1 Number system : Decimal, Binary, Octal and Hexadecimal Number System with mutual conversion,
	1.2 BCD addition and subtraction, 1's and 2's compliments, multiplication & division BCD code (8421), Excess –3 code, gray code, binary to gray code and gray code to binary code conversion.
	1.3 Logic gates: Positive and negative logic , Basic gates, Universal building block. Basic laws of Boolean Algebra, De-Morgan's Theorem, two, three and four variable
	1.4 K-Map, mapping and minimization of SOP and POS expressions, pairs, quads, octet, overlapping, Rolling, concepts of Don't care condition.
II	2.1 Ex-OR gate, Ex-NOR gate circuitry, Half adder, Full adder, binary parallel adder, Serial adder, Half Subtractor, Full Subtractor, 1's complements Subtractor circuit and 2's complements Subtractor circuit.
	2.2 Digital logic Families : Introduction, Basic concepts of RTL, DTL, TTL, ECL and CMOS logic.
	2.3 Decoder : 2 line to 4 line decoder, 1 of 16 decoder, BCD to decimal decoder, BCD to seven segment decoder, Encoder : decimal to BCD encoder.
	2.4 Multiplexer : 2-input, 4-input, 16 input Multiplexer, DeMultiplexer : 1 line to 2 line , 1 line to 4 line and 1 line to 16 line DeMultiplexer.
III	3.1 Flip-flop and timing diagram, RS flip-flop using NOR gate, RS flip-flop using NAND gate, Clocked RS flip-flop, D- latch flip-flop, Preset and Clear,
	3.2 JK flip-flop, Positive and negative edge triggered flop-flops., JK Master Slave flip-flop
	3.3 Counters: Binary ripple counter , up counter , down counter, decade counter and Ring counter and time diagram
	3.4 Registers: Parallel and shift Register, Scaling, PIPO, SIPO, PISO, SOSI Bi-directional shift Register, Application of shift register.
IV	4.1 Digital to analog converter and Analog to Digital converters : D/A converters using binary weighted resistor network and R-2R ladder Network
	4.2 Counter type A/D converter, Successive approximation A/D converter and dual slope converters , applications of DACs and ADCs.
	4.3 Intergrated Circuit Introduction, Technology, Advantages and disadvantages, Basic technology of monolithic IC, Basic processes used in monolithic technology
	4.4 Fabrication of components on monolithic IC, IC packing, symbol and scale of Integration.

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B.Sc. Honours/ Honours with Research (Physics)
Semester – 8th (JAN-JUN-2027)
Paper – IV (Course – DSE-3)
(Digital Electronics)

Unit	Topics
I	1.1 Number system : Decimal, Binary, Octal and Hexadecimal Number System with mutual conversion,
	1.2 BCD addition and subtraction, 1's and 2's compliments, multiplication & division BCD code (8421), Excess -3 code, gray code, binary to gray code and gray code to binary code conversion.
	1.3 Logic gates: Positive and negative logic , Basic gates, Universal building block. Basic laws of Boolean Algebra, De-Morgan's Theorem, two, three and four variable
	1.4 K-Map, mapping and minimization of SOP and POS expressions, pairs, quads, octet, overlapping, Rolling, concepts of Don't care condition.
II	2.1 Ex-OR gate, Ex-NOR gate circuitry, Half adder, Full adder, binary parallel adder, Serial adder, Half Subtractor, Full Subtractor, 1's complements Subtractor circuit and 2's complements Subtractor circuit.
	2.2 Digital logic Families : Introduction, Basic concepts of RTL, DTL, TTL, ECL and CMOS logic.
	2.3 Decoder : 2 line to 4 line decoder, 1 of 16 decoder, BCD to decimal decoder, BCD to seven segment decoder, Encoder : decimal to BCD encoder.
	2.4 Multiplexer : 2-input, 4-input, 16 input Multiplexer, DeMultiplexer : 1 line to 2 line , 1 line to 4 line and 1 line to 16 line DeMultiplexer.
III	3.1 Flip-flop and timing diagram, RS flip-flop using NOR gate, RS flip-flop using NAND gate, Clocked RS flip-flop, D- latch flip-flop, Preset and Clear,
	3.2 JK flip-flop, Positive and negative edge triggered flop-flops., JK Master Slave flip-flop
	3.3 Counters: Binary ripple counter , up counter , down counter, decade counter and Ring counter and time diagram
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	4.2 Counter type A/D converter, Successive approximation A/D converter and dual slope converters , applications of DACs and ADCs.
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	4.4 Fabrication of components on monolithic IC, IC packing, symbol and scale of Integration.

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