Department of Computer Application

Teaching Plan 2020-21

Program: BCA **Semester: Odd**
Course: BCA1B01 – Computer Fundamentals and HTML **Class: Semester 1**

MONTH	MODULES COVERED	MODULES AS PER SYLLABUS (Total Modules- 5)	REMARKS(Bridge / Remedial programs, Examinations, Additional Hours Handled)
November	Module1 & 2	Mathematical Logic: Propositions and logical operators, Truth tables, equivalence and implementation, Laws of logic, Quantifiers.	
December	Module 2	Boolean Algebra and its properties, Algebra of propositions & examples, De-Morgan"s Laws, Partial order relations, greatest lower bound , least upper bound, Algebra of electric circuits & its applications. Design of simple automatic control system	
January	Module 3 & 4	Graph: Simple and multigraph, Incidence and degree, Isomorphism, Sub graphs and Union of graphs, connectedness, Walks, Paths and Circuits, Euler"s Formula, Eulerian graph, Hamiltonian graph, Chromatic Graphs, Planer Graphs, Travelling salesman problem, Complete, Regular and Bipartite graphs, Directed Graphs Trees: Properties of trees, pendant vertices. Centre of a tree, rooted and binary trees, spanning trees, spanning tree algorithms, fundamental. circuits; spanning trees of a weighted graph: cutsets and cut-vertices; fundamental cutsets; connectivity and separativity; network. flows; max-flow min-cut theorem.	1st Internal Exam
February	Module 5	Plan on graphs, dual graphs, Kuratowski's two graph, matrix representation of graphs, incidence matrix, directed graphs, digraphs, directed paths and connectedness. Eular digraphs	
March	Revision	NA	2nd Internal Exam

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Staff in Charge Jabin T.H

Department of Computer Application

Teaching Plan 2020-21

Program : BCA **Semester : ODD**

Course : BCA3B04 Data structure using c **Class : Semester 3**

MONTH	MODULES COVERED	MODULES AS PER SYLLABUS (Total Modules- 5)	REMARKS(Bridge / Remedial programs,Examinations, Additional Hours Handled)
June	Module1	Introduction: Elementary data organization, Data Structure definition, Data type vs. data structure, Categories of data structures, Data structure operations, Applications of data structures, Algorithms complexity and time-space trade off, Big-O notation. Strings: Introduction, strings, String operations, Pattern matching algorithms	
July	Module 2	Arrays: Introduction, Linear arrays, Representation of linear array in memory, Traversal, Insertions, Deletion in an array, Multidimensional arrays, Parallel arrays, sparse matrix. Linked List: Introduction, Array vs. linked list, Representation of linked lists in memory, Traversal, Insertion, Deletion, Searching in a linked list, Header linked list, Circular linked list, Two-way linked list, Applications of linked lists, Algorithm of insertion/deletion in Singly Linked List (SLL).	
August	Module 3	Stack: primitive operation on stack, algorithms for push and pop. Representation of Stack as Linked List and array, Stacks applications: polish notation, recursion. Introduction to queues: Primitive Operations on the Queues, Circular queue, Priority queue, Representation of Queues as Linked List and array, Applications of queue: Algorithm on insertion and deletion in simple queue and circular queue.	1st Internal Exam
September	Module 4	Trees - Basic Terminology, representation, Binary Trees, Tree Representations using Array & Linked List, Basic operation on Binary tree: insertion, deletion and processing, Traversal of binary trees: In order, Pre-order & post-order, Algorithm of tree traversal with and without recursion, Binary Search Tree, Operation on Binary Search Tree, expression trees, implementation using pointers, applications	
October	Module 5	Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs, graph traversal- depth-first and breadth-first traversal of graphs, applications. Searching: sequential searching, binary searching, Hashing – linear hashing, hash functions, hash table searching; Sorting: Quick Sort, Exchange sort, Selection sort and Insertion sort.	2nd Internal Exam

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Department of Computer Application 2020-2021

Program : BCA **Semester : ODD**
Course : A11 Python Programming **Class : Semester 3**

MONTH	MODULES COVERED	MODULES AS PER SYLLABUS (Total Modules- 4)	REMARKS(Refresher/Orientation programs,Examinations, Additional Hours Handled)
June	Module1	Introduction to python, features, IDLE, python interpreter, Writing and executing python scripts, comments, identifiers, keywords, variables, data type, operators, operator precedence and associativity, statements, expressions, user inputs, type function, eval function, print function	
July	Module 2	Boolean expressions, Simple if statement, if-elif-else statement, compound boolean expressions, nesting, multi way decisions. Loops: The while statement, range functions, the for statement, nested loops, break and continue statements, infinite loops.	
August	Module 3	Functions, built-in functions, mathematical functions, date time functions, random numbers, writing user defined functions, composition of functions, parameter and arguments, default parameters, function calls, return statement, using global variables, recursion.	1st Internal Exam
September	Module 4	String and string operations, List- creating list, accessing, updating and deleting elements from a list, basic list operations. Tuple- creating and accessing tuples in python, basic tuple operations. Dictionary, built in methods to access, update and delete dictionary values. Set and basic operations on a set.	
October	Revision	NA	2nd Internal Exam

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Teaching plan 2020-21

Program : psychology **Semester : ODD**

Course : STA1C02 Descriptive statistics **Class : Semester 1**

MONTH	MODULES COVERED	MODULES AS PER SYLLABUS (Total Modules- 5)	REMARKS(Refresher/Orientation programs,Examinations, Additional Hours Handled)
October	Module1	Basic idea about data, collection of data,primary and secondary data,diagramatic representation of data	
November	Module 2	Classification and tabulation of data, graphical representation of data, Histogram, frequency curve, frequency polygon,ogives	
December	Module 3	Measures of central tendency,mean,median,mode, geometric mean,Harmonic mean.Advantages and disadvantages	
January	Module 4	Measures of dispersion,Range,Quartile deviation,standard deviation,Mean deviation.advantages and disadvantages	
February	Module 5	Skewness and kurtosis, pearsons and Bowleys coefficient of skewness.	

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Teaching Plan 2020-21

Program: BCA **Semester: ODD**

Course:BCA5B09 -Web Programming using PHP **Class : Semester 5**

MONTH	MODULES COVERED	MODULES AS PER SYLLABUS (Total Modules- 5)	REMARKS(Bridge / Remedial programs,Examinations,Additional Hours Handled)
June	Module1	Introduction web-documents: Static, Dynamic, Active - Web programming: client side and server side scripting. HTML 5: Document Structure, Elements, Attributes, Basic HTML Data types. Using HTML5 form elements: datalist, keygen, output,progress, meter. File uploading using forms - Frameset and frames. CSS: External CSS, CSS3Syntax, Navigation Bar - Image Gallery – Image Opacity.	
July	Module 2	Javascript: Introduction, Client side programming, script tag, comments, variables. Including JavaScript in HTML: head, body, external. Data types. Operators: Arithmetic, Assignment, Relational, Logical. Conditional Statements, Loops, break and continue. Output functions: write, writeln, popup boxes: prompt, alert, confirm. Functions: Built-in Global Functions: alert(), prompt(), confirm(), isNan(), Number(), parseInt(). User Defined Functions, Calling Functions with Timer, Events Familiarization: onLoad, onClick, onBlur, onSubmit, onChange, Document Object Model (Concept). Objects: String, Array, Date.	
August	Module 3	PHP: Introduction, Server side programming, Role of Web Server software, Including PHP Script in HTML: head, body, external. Comments, Data types, variables and scope, echo and print. Operators: Arithmetic, Assignment, Relational, Logical. Conditional Statements, Loops, break and continue. User Defined Functions.	1st Internal Exam
September	Module 4	Working with PHP: Passing information between pages, HTTP GET and POST method, Cookie, Session. String functions: strlen, strops, strstr, strcmp, substr, str_replace, string case, Array constructs: array(),list() and foreach(). Header(). Module 5 : PHP &PostgreSQL: Features of PostgreSQL, data types, PostgreSQL commands – CREATE DATABASE, CREATE TABLE, DESCRIBE TABLE (\d table_name or using usinginformation_schema), SELECT, SELECT INTO, CREATE AS, DELETE, UPDATE, INSERT	
October	Module 5	PHP - PostgreSQL Integration: Establishing Database	2nd Internal Exam

	and Revision	Connection (pg_connect(),pg_connection_status(), pg_dbname()), Getting Error String (pg_last_error()), Closing databaseConnection (pg_close()), Executing SQL statements (pg_query(), pg_execute()), Retrieving Data (pg_fetch_row(), pg_fetch_array(), pg_fetch_all()) , Insertionand Deletion of data using PHP, Displaying data from PostrgreSQL database in webpage. Introduction to AJAX - Implementation of AJAX in PHP -.	

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Teaching Plan 2020-21

Program: BCA
Semester: Even
Course: BCA4C08- Computer Graphics
Class: Semester 4

MONTH	MODULES COVERED	MODULES AS PER SYLLABUS (Total Modules- 5)	REMARKS(Bridge / Remedial programs, Examinations, Additional Hours Handled)
November	Module1	Introduction to computer graphics definition, Application, Pixel, Frame Buffer, Raster and Random Scan Display, Display Devices CRT, Color CRT Monitors, basics of LCD and LED Monitors	
December	Module 2 & 3	Scan Conversion of Line, DDA Algorithm of Line Drawing, Scan Conversion of Circles- Bresenham"s Circle Generating algorithm, Polygon Filling, Scan Line Polygon Filling Algorithm Two-Dimensional Transformation, Translation, Rotation, Scaling.	
January	Module 3 & 4	Homogeneous Coordinates, Reflection, Shear Window to Viewport Transformation, Clipping, Line Clipping, Cohen Sutherland Line Clipping, Polygon Clipping, Sutherland and Gray Hodgman Polygon Clipping Algorithm.	1st Internal Exam
February	Module 5	Color Models and Color Applications Light and Color, Different color models, RGB, CMY, YIQ. Introduction to GIMP, Image Manipulation Using GIMP.	
March	Revision	NA	2nd Internal Exam

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Program : BCA
Course : BCA6B16C- Software testing & Quality Assurance

Semester : EVEN
Class : Semester 6

MONTH	MODULES COVERED	MODULES AS PER SYLLABUS (Total Modules- 5)	REMARKS(Refresher/Orientation programs,Examinations, Additional Hours Handled)
November	Module1	Phases of Software project - Quality Assurance, Quality control - Testing, Verification and Validation - Process Model to represent Different Phases - Life Cycle models. White-Box Testing: Static Testing - Structural Testing Challenges in White-Box Testing.	
December	Module 2	Black-Box Testing: What is Black, Box Testing?, Why Black, Box Testing?, When to do Black, Box Testing?, How to do Black, Box Testing?, Challenges in White Box Testing, Integration Testing: Integration Testing as Type of Testing, Integration Testing as a phase of Testing, Scenario Testing, Defect Bash.	
January	Module 3	System and Acceptance Testing: system Testing Overview, Why System testing is done? Functional versus Non, functional Testing, Functional testing, Non, functional Testing, Acceptance Testing, Summary of Testing Phases.	1st Internal Exam
February	Module 4	Performance Testing: Factors governing Performance Testing, Methodology of Performance Testing, tools for Performance Testing, Process for Performance Testing, Challenges. Regression Testing: What is Regression Testing? Types of Regression Testing, When to do Regression Testing, How to do Regression Testing, Best Practices in Regression Testing.	
March	Module 5	Test Planning, Management, Execution and Reporting: Test Planning, Test Management, Test Process, Test Reporting, Best Practices. Test Metrics and Measurements: Project Metrics, Progress Metrics, Productivity Metrics, Release Metrics.	2nd Internal Exam

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Teaching Plan 2020-21

Program: BCA **Semester: EVEN**

Course: A14 Microprocessor Architecture and Programming **Class : Semester 4**

MONTH	MODULES COVERED	MODULES AS PER SYLLABUS (Total Modules- 4)	REMARKS(Bridge / Remedial programs,Examinations,Additional Hours Handled)
November	Module1	General architecture of computer, Introduction to Microprocessor, Memory classification, Introduction to 8085,Microprocessor bus organizations ,data bus, address bus, control bus. Memory addressing, memory mapping. 8085 architecture in detail. General purpose registers and special purpose registers, flag register -8085 pins and signals.	
December	Module 2	Assembly language programming basics. Opcode, Mnemonics etc. 8085 instruction set ,Data transfer ,Arithmetic and Logic, Shifting and rotating, Branching/Jump, Program control. Addressing modes. Memory read and write cycle.Timing diagram. Instruction cycle , machine cycle and T-states.Types of I/O addressing. Simple programs.	
January	Module 3	Types of programming techniques looping, indexing (pointers),delay generation. Stack in 8085, call and return Instructions. Data transfer between stack and microprocessor. Subroutine and delay programs. Interrupts in 8085. Interrupt driven programs. Interfacing - Programmable peripheral devices - 8255A, 8254, 8237.	1st Internal Exam
February	Module 4	Introduction to 8086/88 microprocessors – overview, 8086 internal architecture. The execution unit, BIU, Registers, Flags, Segmentation, physical address calculation, addressing modes	
March	Revision		2nd Internal Exam

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Teaching Plan 2020-21

Program: BCA **Semester: EVEN**

Course: A13 Data Communication and Optical Fibers **Class : Semester 4**

MONTH	MODULES COVERED	MODULES AS PER SYLLABUS (Total Modules- 5)	REMARKS(Bridge / Remedial programs,Examinations,Additional Hours Handled)
November	Module1	Introduction- Components, Networks, Protocols and standards, Basic Concepts: LineConfiguration, Topology Transmission mode, analog and digital signals, Encoding and modulatinganalog-to-digital conversion, digital to analog conversion, digital data transmission, DTE-DCE interface, modems, cable modems. Transmission media: guided media, unguided media, andtransmission impairment.	
December	Module 2	Multiplexing: Many to one/ one to many, frequency division multiplexing, wave divisionmultiplexing, TDM, multiplexing applications: the telephone system, Cellular System, MobileCommunication-GSM, Mobile Services, GSM system Architecture, Radio Interface in GSM	
January	Module 3	Data link Control: Line Discipline, flow control, error control, Data link Protocols: AsynchronousProtocols, synchronous protocols, character oriented protocols, bit – oriented protocols, link accessprocedures. Local Area Networks: Ethernet, token bus, token ring, FDDI, Comparison, Switchingcircuitswitching, packet switching, message switching, integrated services digital networks(ISDN): services, history, subscriber access to ISDN.	1st Internal Exam
February	Module 4	Overview of Optical Fiber Communication - Introduction, historical development, general system,advantages, disadvantages, and applications of optical fiber communication, optical fiberwaveguides, fiber materials, Optical Sources And Detectors- Introduction, LED"s, LASER diodes,Photo detectors. Ray theory, cylindrical fiber, single mode fiber, cutoff wave length, mode fielddiameter.	
March	Revision	NA	2nd Internal Exam

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TEACHING PLAN 2020-21

PROGRAMME: BSc **SEMESTER:EVEN**

COURSE: ELECTRODYNAMICS II **CLASS:** IV SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	**Network theorems** Kirchhoff's laws, Voltage sign and current direction, Solution of simultaneous equations using determinants,	**Network theorems** Kirchhoff's laws, Voltage sign and current direction, Solution of simultaneous equations using determinants, Source conversion, Superposition theorem, Ideal equivalent circuits	Completed the portions of third semester in November only 2 hours per week
DECEMBER	Source conversion, Superposition theorem, Ideal equivalent circuits,Thevenin's theorem, Reciprocity theorem, Delta / Star transformation – Star / Delta transformation – Norton's theorem, Maximum powertransfer theorem.	Thevenin's theorem, Reciprocity theorem, Delta / Star transformation – Star / Delta transformation – Norton's theorem, Maximum powertransfer theorem. **Unit 3 – Transient currents** Types of transients – DC transient currents in R-L circuits – Short circuit current – Time constant – DC transient currents in R-C circuits – Double energy transients – Theory ofBG	
JANUARY	**Unit 3 – Transient currents** Types of transients – DC transient currents in R-L circuits – Short circuit current – Time constant – DC transient currents in R-C circuits – Double energy transients – Theory ofBG	**Unit 4 – AC circuits** A resonant circuit – Alternating current – Alternating current networks – Admittance and impedance – Power and energy in AC circuits	

FEBRUARY	**Unit 4 – AC circuits** A resonant circuit – Alternating current – Alternating current networks – Admittance and impedance – Power and energy in AC circuits	**Unit 1 - Electrodynamics** Electromotive force – Ohm's law, electromotive force, motional emf – Electromagnetic induction - Faraday's law, induced electric field, inductance, energy inmagnetic fields –	Second semester exam started on Feb 8 th
MARCH	Electromotive force – Ohm's law, electromotive force, motional emf – Electromagnetic induction - Faraday's law, induced electric field, inductance, energy inmagnetic fields –	Maxwell's equations – Electrodynamics before Maxwell, Maxwell's modification of Ampere's law, Maxwell's equations, Magnetic charge, Maxwell'sequations inside matter, Boundary conditions – Continuity equation – Poynting's theorem	
APRIL		Maxwell's equations – Electrodynamics before Maxwell, Maxwell's modification of Ampere's law, Maxwell's equations, Magnetic charge, Maxwell'sequations inside matter, Boundary conditions -- Continuity equation – Poynting's theorem	

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DEPARTMENT OF PHYSICS

TEACHING PLAN 2020-21

PROGRAMME: BSc.   **SEMESTER:ODD**

COURSE: ELECTRODYNAMICS I   **CLASS:** III SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
JUNE	Vector Algebra: Vector operations - Vector algebra: Component form – Triple products – Position, Displacement and Separation vectors – How vectors transform. Differential Calculus: Ordinaryderivatives – GradientDivergence – Curl – Product rules – Second derivatives	**Unit 1 – Vector Calculus** Vector Algebra: Vector operations - Vector algebra: Component form – Triple products – Position, Displacement and Separation vectors – How vectors transform. Differential Calculus: Ordinaryderivatives – Gradient – The Del operator – Divergence – Curl – Product rules – Second derivatives. Integral Calculus: Line integral, surface integral and volume integral	
JULY	Integral Calculus: Line integral, surface integral and volume integral - Fundamental theorem of calculus – Fundamental theorem for Gradients – Fundamental theorem for divergences: Gauss"s Divergence Theorem – Fundamental theorem for curls: Stoke"s theorem . Spherical polar coordinates – Cylindrical coordinates – Their relationship to Cartesian coordinates – Expressing differential displacement vector, differential area vectors, differential volume element, gradient operator, divergence operator and curl operator in spherical polar and cylindrical coordinates.	Fundamental theorem of calculus – Fundamental theorem for Gradients – Fundamental theorem for divergences: Gauss"s Divergence Theorem – Fundamental theorem for curls: Stoke"s theorem . Spherical polar coordinates – Cylindrical coordinates – Their relationship to Cartesian coordinates – Expressing differential displacement vector, differential area vectors, differential volume element, gradient operator, divergence operator and curl operator in spherical polar and cylindrical coordinates. Dirac delta function: – One-dimensional delta function – Three-dimensional delta function. Helmholtz theorem – Divergence-less vector fields – Curl-less vector fields – Potentials.	
AUGUST	Dirac delta function: – One-dimensional delta function – Three-dimensional delta function.	**Unit 2 – Electrostatics**	

	Helmholtz theorem – Divergence-less vector fields – Curl-less vector fields – Poten[illegible]. Electrostatic field – Coulomb"s law, Electric field. Continuous charge distributions - Divergence and curl of electrostatic field, Field lines and Gauss"s law, The divergence of E. Applications of Gauss law, Curl of E	Electrostatic field – Coulomb"s law, Electric field, Continuous charge distribu[illegible]ns - Divergence and curl of electrostatic field. Field lines and Gauss"s law. The divergence of E. Applications of Gauss law. Curl of E – Electric potential – Comments on potential, Poisson"s equation and Laplace's equation. The potential of a localized charge distribution. Electrostatic boundaryconditions	
SEPTEMBER	Electric potential – Comments on potential, Poisson"s equation and Laplace's equation, The potential of a localized charge distribution, Electrostatic boundary conditions – Work and energy in electrostatics, The work done in moving a charge, The energy of point charge distribution, The Energy of a continuous charge distribution, Comments on Electrostatic energy	Work and energy in electrostatics, The work done in moving a charge, The energy of point charge distribution, The Energy of a continuous charge distribution. Comments on Electrostatic energy –Conductors, Basic properties of conductors, Induced charges, The Surface charge on a conductor, The force on surface charge, Capacitors.	
OCTOBER	Conductors, Basic properties of conductors, Induced charges, The Surface charge on a conductor, The force on surface charge, Capacitors. Polarization – Dielectrics, Induced dipoles, Alignment of polar molecules, Polarization – The field of a polarized object , Bound charges, Physical interpretation of bound charges, The field inside a dielectric – The electric displacement – Gauss"s law in presence of dielectrics, Boundary conditions for **D**	**Unit 3 – Electric fields in matter** Polarization – Dielectrics, Induced dipoles, Alignment of polar molecules. Polarization – The field of a polarized object , Bound charges, Physical interpretation of bound charges. The field inside a dielectric – The electric displacement – Gauss"s law in presence of dielectrics, Boundary conditions for **D** – Linear dielectrics, Susceptibility, Permittivity, Dielectric constant, Boundary value problems with linear dielectrics, Energy in dielectric systems, Forces on dielectrics.	First semester university exam. Hence rest of the topic completed in November

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PG DEPARTMENT OF COMMERCE

TEACHING PLAN 2020-21

PROGRAMME: B.Sc Physics **SEMESTER: EVEN**

COURSE: THERMAL AND STATISTICAL PHYSICS **CLASS: VI Semester**

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	**Module I:**Thermodynamic system- Thermal equilibrium-zeroth law-concept of heat andtemperature-thermodynamic equilibrium-quasistatic process -extensive and intensivevariables-thermodynamic process (cyclic and non cyclic)-indicator diagram- workdone inisothermal, adiabatic, isobaric and isochoric –cyclic processes- concept ofpath and pointfunctions-internal energy- first law of thermodynamics-relation between P,T,V,inadiabatic process-slope of adiabatic and isothermal process -application of first law to heatcapacities-(relation between Cp and Cv) and latent heat– adiabatic and isothermal elasticity of a gas)	**Module I:**Thermodynamic system- Thermal equilibrium-zeroth law-concept of heat andtemperature-thermodynamic equilibrium- quasistatic process -extensive and intensivevariables- thermodynamic process (cyclic and non cyclic)-indicator diagram- workdone inisothermal, adiabatic, isobaric and isochoric –cyclic processes- concept ofpath and pointfunctions-internal energy- first law of thermodynamics-relation between P,T,V,inadiabatic process-slope of adiabatic and isothermal process -application of first law to heatcapacities-(relation between Cp and Cv) and latent heat– adiabatic and isothermal elasticity of a gas)	
DECEMBER	**Module II:** Reversible and irreversible processes , Conditions for reversibility-second law of thermodynamics-heat engine, Carnot engine, derivation for expression for efficiency,efficiency, Carnot's refrigerator-thermodynamical scale of temperature- Carnot's theoremand its proof.- application of second law(Clausius-Clapyron equation)-internalcombustion engine-otto engine ,diesel engine -its efficiencies	**Module II:** Reversible and irreversible processes , Conditions for reversibility-second law of thermodynamics-heat engine, Carnot engine, derivation for expression for efficiency, efficiency, Carnot's refrigerator-thermodynamical scale of temperature- Carnot's theorem and its proof.- application of second law(Clausius-Clapyron equation)- internal combustion engine-otto engine ,diesel engine -its efficiencies	
JANUARY	**Module III:** Entropy and adiabatics- definition of	**Module III:** Entropy and adiabatics- definition of entropy-	

	entropy-Change of entropy in a Carnot cycle-Change of entropy in an reversible cycle(Claussius theorem) -Change of entropy in an irreversiblecycle (Claussius inequality)- Change in entropy of a perfect gas during a process-Changein entropy in a irreversible process-change in entropy due to free expansion-Change in entropy due to spontaneous cooling by conduction, radiation....etc, - Principle of increaseof entropy-Entropy and available energy-Entropy and disorder-Nernst heat theorem-entropy temperature diagram	Change of entropy in a Carnot cycle-Change of entropy in an reversible cycle (Claussius theorem) -Change of entropy in an irreversible cycle (Claussius inequality)-Change in entropy of a perfect gas during a process-Change in entropy in a irreversible process-change in entropy due to free expansion-Change in entropy due to spontaneous cooling by conduction, radiation....etc, - Principle of increase of entropy-Entropy and available energy-Entropy and disorder-Nernst heat theorem-entropy temperature diagram	
FEBRUARY	**Module IV**:.Thermodynamic functions-Enthalpy, Helmhlotz function, Gibbs function-Maxwell's thermodynamic relations-TdS relations-application of Maxwell's thermodynamicalrelations-1.variation of intrinsic energy with volume-2.Joule-Kelvin coefficient-3.Claussius-Clapeyron equation from Maxwell's thermodynamic relations- changes ofphase.	**Module IV**:. Thermodynamic functions-Enthalpy, Helmhlotz function, Gibbs function-Maxwell's thermodynamic relations-TdS relations-application of Maxwell's thermodynamical relations-1.variation of intrinsic energy with volume-2.Joule-Kelvin coefficient-3.Claussius-Clapeyron equation from Maxwell's thermodynamic relations- changes of phase.	
MARCH	**Module V& VI:**Statistical distributions-Maxwell-Boltzmann statistics (no derivation)-Distribution of molecular energies in an ideal gas-Average molecular energy- Equi partition theorem-Maxwell-Boltzmann speed distribution law-Expressions for rms speed, most probablespeed and mean speed. Bose Einstein and Fermi Dirac distribution laws (no derivations)- Application of BEdistribution law to black body radiation-Planck's radiation law-Stefan's law-Wien'sdisplacement law-Fermi energy-Expression for Fermi energy of electron system-electronenergy distribution- average electron energy at absolute zero-Degeneracy pressure and itsastrophysical significance.	**Module V& VI:**Statistical distributions-Maxwell-Boltzmann statistics (no derivation)-Distribution of molecular energies in an ideal gas-Average molecular energy-Equi partition theorem-Maxwell-Boltzmann speed distribution law-Expressions for rms speed, most probable speed and mean speed. Bose Einstein and Fermi Dirac distribution laws (no derivations)- Application of BE distribution law to black body radiation-Planck's radiation law-Stefan's law-Wien's displacement law-Fermi energy-Expression for Fermi energy of electron system-electron energy distribution- average electron energy at absolute zero-Degeneracy pressure and its astrophysical significance.	

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PG DEPARTMENT OF PHYSICS

TEACHING PLAN 2020-21

PROGRAMME: B. Sc Physics **SEMESTER:ODD**

COURSE:ELECTRONICS (ANALOG & DIGITAL) **CLASS: VSemester**

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
JUNE	**Module I:**Semiconductor rectifiers and DC Power supplies: Preliminaries of rectification, Bridge rectifier, Efficiency, Nature of rectified output,Ripple factor, different types of filter circuits, voltage multipliers, Zener diode voltage stabilization	**Module I:**Semiconductor rectifiers and DC Power supplies: Preliminaries of rectification, Bridge rectifier, Efficiency, Nature of rectified output,Ripple factor, different types of filter circuits, voltage multipliers, Zener diode voltage stabilization	
JULY	**Module II:** Different transistor amplifier configurations:- C-B, C-E, C-C, their characteristics, amplification factors, their relationships, Load line Analysis, Expressions for voltage gain,current gain and power gain of C.E amplifier, cut-off and saturation points, Transistorbiasing, Different types of biasing - Base resistor, voltage divider bias method, single stagetransistor amplifier circuit, load line analysis, DC and AC equivalent circuits	**Module II:** Different transistor amplifier configurations:- C-B, C-E, C-C, their characteristics, amplification factors, their relationships, Load line Analysis, Expressions for voltage gain,current gain and power gain of C.E amplifier, cut-off and saturation points, Transistorbiasing, Different types of biasing - Base resistor, voltage divider bias method, single stagetransistor amplifier circuit, load line analysis, DC and AC equivalent circuits	
AUGUST	**Module III& IV:**Multistage Transistor amplifier: R.C coupled amplifier- frequency response, and gain in decibels, Transformer coupledAmplifiers,Direct Coupled Amplifier,Comparison. Feedback Circuits and Oscillators : Basic principles of feedback, negative feedback and its advantages, positive feedback circuits Oscillatory Circuits-LC, RC oscillators, tuned collector oscillator, Hartley,Colpitt's, phase shift and crystal oscillators - their expressions for frequency.	**Module III& IV:**Multistage Transistor amplifier: R.C coupled amplifier- frequency response, and gain in decibels, Transformer coupledAmplifiers,Direct Coupled Amplifier,Comparison. Feedback Circuits and Oscillators : Basic principles of feedback, negative feedback and its advantages, positive feedback circuits Oscillatory Circuits-LC, RC oscillators, tuned collector oscillator, Hartley,Colpitt's, phase shift and crystal oscillators - their expressions for frequency.	
SEPTEMBER	**Module V& VI:** Digital Communication : Transmission and reception of radio waves, types of	**Module V& VI:** Digital Communication : Transmission and reception of radio waves, types of	

	modulation, AM, FM their comparison advantages, demodulation, pulse code modulation Special Devices and Opamp: LED, basic idea of UJT, FET, MOSFET, OP-amp-basic operation, application, inverting, Non-inverting, summing amplifiers, Differentiator integrator	modulation, AM, FM their comparison advantages, demodulation, pulse code modulation Special Devices and Opamp: LED, basic idea of UJT, FET, MOSFET, OP-amp-basic operation, application, inverting, Non-inverting, summing amplifiers, Differentiator integrator	
OCTOBER	**Module VII & VIII:** Number system : Positional number system, binary number system, Binary - Decimal conversions,Representation of positive integer, negative number representation, Floating point Binaryarithmetic, Compliments and its algebra. Logic gates and circuits : Fundamental gates, Universal gates, De Morgan's theorem, Exclusive OR gate, Boolean relations, Karnaugh Map, Half adder, Full adder, RS Flip Flop, JK Flip flop	**Module VII & VIII:** Number system : Positional number system, binary number system, Binary - Decimal conversions,Representation of positive integer, negative number representation, Floating point Binaryarithmetic, Compliments and its algebra. Logic gates and circuits : Fundamental gates, Universal gates, De Morgan's theorem, Exclusive OR gate, Boolean relations, Karnaugh Map, Half adder, Full adder, RS Flip Flop, JK Flip flop	

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MES ASMABI COLLEGE, P.VEMBALLUR
DEPARTMENT OF PHYSICS

TEACHING PLAN 2020-21

PROGRAMME: MSc **SEMESTER:ODD**

COURSE: MATHEMATICAL PHYSICS I **CLASS:** I SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	**1.Vectors:** Rotation of coordinates, Orthogonal curvilinear coordinates, Gradient	**1.Vectors:** Rotation of coordinates, Orthogonal curvilinear coordinates, Gradient, Divergence and Curl in orthogonal curvilinear coordinates, Rectangular, cylindrical and spherical polar coordinates, Laplacian operator, Laplace's equation – application to electrostatic field and wave equations, Vector integration	Completed the portions of third semester in November only 2 hours per week
DECEMBER	Divergence and Curl in orthogonal curvilinear coordinates, Rectangular, cylindrical and spherical polar coordinates, Laplacian operator, Laplace's equation – application to electrostatic field and wave equations, Vector integration curvilinear coordinates, Rectangular, cylindrical and spherical polar coordinates, Laplacian operator, Laplace's equation – application to electrostatic field and wave equations, Vector integration,	**1.Vectors:** Rotation of coordinates, Orthogonal curvilinear coordinates, Gradient, Divergence and Curl in orthogonal curvilinear coordinates, Rectangular, cylindrical and spherical polar coordinates, Laplacian operator, Laplace's equation – application to electrostatic field and wave equations, Vector integration	
JANUARY	**2.Matrices and Tensors:** Basic properties of matrices (Review only), Orthogonal matrices, Hermitian and Unitary matrices, Similarity and unitary transformations, Diagonalization of matrices, Definition of Tensors, Contraction, Direct products, quotient rule, Pseudo tensors, Dual	**2.Matrices and Tensors:** Basic properties of matrices (Review only), Orthogonal matrices, Hermitian and Unitary matrices, Similarity and unitary transformations, Diagonalization of	

	tensors, Levi Cevita symbol, irre[illegible]ible tensors,	matrices, Definition of [illegible]s, Contraction, Direct products, quotient rule, Pseudo tensors, Dual tensors, Levi Cevita symbol, irreducible tensors.	
FEBRUARY	**3. Second Order Differential Equations:** Partial differential equations of Physics, Separation of variables, Singular points, Ordinary series solution, Frobenius method, A second solution, Self adjoint differential equation, eigenfunctions and values, Boundary conditions, Hermitian operators and their properties, Schmidt orthogonalization, Completeness of functions,	**3. Second Order Differential Equations:** Partial differential equations of Physics, Separation of variables, Singular points, Ordinary series solution, Frobenius method, A second solution, Self adjoint differential equation, eigenfunctions and values, Boundary conditions, Hermitian operators and their properties, Schmidt orthogonalization, Completeness of functions,	Second semester exam started on Feb 8 th
MARCH	**4. Special functions:** Gamma function, Beta function, Delta function, Dirac delta function, Bessel functions of the first and second kinds, Generating function, Recurrence relation, Orthogonality, Neumann function, Spherical Bessel function, Legendre polynomials, Generating function, Recurrence relation, Rodrigues formula, Orthogonality, Associated Legendre polynomials, Spherical harmonics, Hermite polynomials, Laguerre polynomials,	**4. Special functions:** Gamma function, Beta function, Delta function, Dirac delta function, Bessel functions of the first and second kinds, Generating function, Recurrence relation, Orthogonality, Neumann function, Spherical Bessel function, Legendre polynomials, Generating function, Recurrence relation, Rodrigues formula, Orthogonality, Associated Legendre polynomials, Spherical harmonics, Hermite polynomials, Laguerre polynomials,	
APRIL	**5. Fourier Series:** General properties, Advantages, Uses of Fourier series, Properties of Fourier series, Fourier integral, Fourier transform, Properties, Inverse transform, Transform of the derivative, Convolution theorem, Laplace transform,	**5. Fourier Series:** General properties, Advantages, Uses of Fourier series, Properties of Fourier series, Fourier integral, Fourier transform, Properties, Inverse transform, Transform of the derivative, Convolution theorem, Laplace transform,	

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TEACHER: RAMANATHAN K S

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MES ASMABI COLLEGE, P.VEMBALLUR
DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME : BSc

SEMESTER: ODD

COURSE : COMPUTATIONAL PHYSICS

CLASS: V SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
JUNE	**Chapter 1: Introduction to Python Programming** Introduction to algorithm, flowchart and high level Computer programming languages Compilers- Interpreters - Introduction to Python language- Advantages and unique features of Python language - Interactive mode and script mode- Writing and execution of programs -various data types in Python- Reading keyboard input: The raw_input function and input function - print command, formatted printing- open and write function -.	**Unit 1 – Chapter 1: Introduction to Python Programming** Introduction to algorithm, flowchart and high level Computer programming languages Compilers- Interpreters - Introduction to Python language- Advantages and unique features of Python language - Interactive mode and script mode- Writing and execution of programs -various data types in Python- Reading keyboard input: The raw_input function and input function - print command, formatted printing- open and write function - Variables, operators, expressions and statements- String operations, Lists, list operations (len, append, insert, del, remove, reverse, sort, +, *, max, min, count, in, not in, sum), sets, set operations (set, add, remove, in, not in, union, intersection, symmetric difference)-Tuples and Dictionaries, various control and looping statements: (if, if..else, if..elif, while, for, break, continue) - user defined functions- Modules - File input and file output- Pickling.	-
JULY	Variables, operators, expressions and statements- String operations, Lists, list operations (len, append, insert, del, remove, reverse, sort, +, *, max,min, count, in, not in, sum), sets, set operations (set, add, remove, in, not in, union, intersection,symmetric difference)-Tuples and Dictionaries, various control		

	and looping statements: (if, if..else,if..elif, while, for, break, continue) - user defined functions- Modules - File input and file output-Pickling		
AUGUST	**Chapter 2: Numpy and Matplotlib modules** Numpy module: Introduction, creation of arrays and matrices, various array operations, matrix multiplication, inversion. Matplotlib module: Introduction, plot( ), show( ) functions, syntax for plotting graphs , multiple plots, polar plots, labeling, scaling of axes and coloring plots - Plotting of functions – sin(x), cos(x), exp(x), sin2(x), sin(x2)	**Chapter 2: Numpy and Matplotlib modules** Numpy module: Introduction, creation of arrays and matrices, various array operations, matrix multiplication, inversion. Matplotlib module: Introduction, plot( ), show( ) functions, syntax for plotting graphs , multiple plots, polar plots, labeling, scaling of axes and coloring plots - Plotting of functions – sin(x), cos(x), exp(x), sin2(x), sin(x2)	
SEPTEMBER	**Chapter 3: Numerical Methods in Physics** Introduction to numerical methods, Comparison between analytical and numerical methods – Curve Fitting: Principle of least squares, Least square fitting of a straight line -Interpolation: Finitedifference operator, Newton's forward difference interpolation formula, difference table, First and second derivative by Numerical differentiation- Solution of algebraic equations: Bisection method, Newton-Raphson method - Newton Cote's quadrature formula- Numerical integration by Trapezoidal and Simpson's (1/3) method- Solution of differential equations: Euler's method, Runge-Kutta method (Second order) -Taylor's Series expansion of Sin(x) and Cos(x).	**Unit 2** **Chapter 3: Numerical Methods in Physics** Introduction to numerical methods, Comparison between analytical and numerical methods - Curve Fitting: Principle of least squares, Least square fitting of a straight line -Interpolation: Finite difference operator, Newton's forward difference interpolation formula, difference table, First and second derivative by Numerical differentiation- Solution of algebraic equations: Bisection method, Newton-Raphson method - Newton Cote's quadrature formula- Numerical integration by Trapezoidal and Simpson's (1/3) method- Solution of differential equations: Euler's method, Runge-Kutta method (Second order) -Taylor's Series expansion of Sin(x) and Cos(x).	
OCTOBER	**Chapter 4: Computational Physics** Formulation: From analytical to numerical methods - Significance of Computer in numerical methods- Applications of Euler's method: Theory, and graphical simulation by programming: motions of a freely falling body, a body dropped into a highly viscous medium, two dimensional projectile motion and radioactive decay - Accuracy considerations (elementary ideas)	**Unit 3 Chapter 4: Computational Physics** Formulation: From analytical to numerical methods - Significance of Computer in numerical methods- Applications of Euler's method: Theory, and graphical simulation by programming: motions of a freely falling body, a body dropped into a highly viscous medium, two dimensional projectile motion and radioactive decay - Accuracy considerations (elementary ideas)	

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MES ASMABI COLLEGE, P.VEMBALLUR
PG DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME: MSc

SEMESTER: ODD

COURSE: QUANTUM MECHANICS II

CLASS: III SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	**5.Relativistic Quantum Mechanics** Klein-Gordon equation – First order wave equations – Weyl equation	**5.Relativistic Quantum Mechanics** Klein-Gordon equation – First order wave equations – Weyl equation – Dirac equation – Properties of Dirac matrices – Dirac particle is spin-1/2 particle – Spinor – Equation of continuity – Dirac particle in an external magnetic field ; Non- relativisitc limit – Hole theory	
DECEMBER	– Dirac equation – Properties of Dirac matrices – Dirac particle is spin-1/2 particle – Spinor – Equation of continuity – Dirac particle in an external magnetic field : Non- relativisitc limit – Hole theory. **4. Scattering** Scattering amplitude – Method of partial waves – Scattering by a central potential – Optical theorem – Scattering by a square-well potential	**4. Scattering** Scattering amplitude – Method of partial waves – Scattering by a central potential – Optical theorem – Scattering by a square-well potential	
JANUARY	**1.Time-Independent Perturbation Theory** Non-degenerate perturbation theory – First-order theory and Second-order theory – Examples : (1) Linear harmonic oscillator (2) Anharmonic oscillator – Degenerate perturbation theory – Two-fold degeneracy –Higher-order degeneracy – The fine-structure of hydrogen – Relativistic correction – Spin-orbit coupling	**1.Time-Independent Perturbation Theory** Non-degenerate perturbation theory – First-order theory and Second-order theory – Examples : (1) Linear harmonic oscillator (2) Anharmonic oscillator – Degenerate perturbation theory – Two-fold degeneracy – Higher-order degeneracy – The fine-structure of hydrogen – Relativistic correction – Spin-orbit coupling - Zeeman effect – Weak-field Zeeman effect – Strong-field Zeeman effect – Intermediate-field Zeeman effect –	2 semester exam started

		Hyperfine splitting – Linear Stark effect in the hydrogen atom.	
FEBRUARY	Zeeman effect – Weak-field Zeeman effect – Strong-field Zeeman effect – Intermediate-field Zeeman effect –Hyperfine splitting – Linear Stark effect in the hydrogen atom. **3.Time-dependent perturbation theory** First order time-dependent perturbation theory – Constant perturbation – Transition to a continuum – Fermi's Golden rule – Scattering cross section in the Born approximation – Harmonic perturbation – Radiative transitions in atoms	**3.Time-dependent perturbation theory** First order time-dependent perturbation theory – Constant perturbation – Transition to a continuum – Fermi's Golden rule – Scattering cross section in the Born approximation – Harmonic perturbation – Radiative transitions in atoms.	
MARCH	**2.Variational Method and WKB Method** Bound states (Ritz method) – Linear harmonic oscillator – Helium atom – WKB wavefunction in classical region –Example : Potential well with two vertical walls – WKB wavefunction in nonclassical region – Example : Tunneling – Connection formulae – Examples : (1) Potential well with one vertical wall (2) Potential well with no vertical walls	**2.Variational Method and WKB Method** Bound states (Ritz method) – Linear harmonic oscillator – Helium atom – WKB wavefunction in classical region –Example : Potential well with two vertical walls – WKB wavefunction in nonclassical region – Example : Tunneling – Connection formulae – Examples : (1) Potential well with one vertical wall (2) Potential well with no vertical walls.	

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DEPARTMENT OF PHYSICS

TEACHING PLAN 2020-21

PROGRAMME: MSc

SEMESTER:ODD

COURSE: MATHEMATICAL PHYSICS I

CLASS: I SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	1.**Vectors**: Rotation of coordinates, Orthogonal curvilinear coordinates, Gradient	1.**Vectors**: Rotation of coordinates, Orthogonal curvilinear coordinates, Gradient, Divergence and Curl in orthogonal curvilinear coordinates, Rectangular, cylindrical and spherical polar coordinates, Laplacian operator, Laplace's equation – application to electrostatic field and wave equations, Vector integration	Completed the portions of third semester in November only 2 hours per week
DECEMBER	Divergence and Curl in orthogonal curvilinear coordinates, Rectangular, cylindrical and spherical polar coordinates, Laplacian operator, Laplace's equation – application to electrostatic field and wave equations, Vector integration curvilinear coordinates, Rectangular, cylindrical and spherical polar coordinates, Laplacian operator, Laplace's equation – application to electrostatic field and wave equations, Vector integration,	1.**Vectors**: Rotation of coordinates, Orthogonal curvilinear coordinates, Gradient, Divergence and Curl in orthogonal curvilinear coordinates, Rectangular, cylindrical and spherical polar coordinates, Laplacian operator, Laplace's equation – application to electrostatic field and wave equations, Vector integration	
JANUARY	2.**Matrices and Tensors**: Basic properties of matrices (Review only), Orthogonal matrices, Hermitian and Unitary matrices, Similarity and unitary transformations, Diagonalization of matrices, Definition of Tensors, Contraction, Direct products, quotient rule, Pseudo tensors, Dual	2.**Matrices and Tensors**: Basic properties of matrices (Review only), Orthogonal matrices, Hermitian and Unitary matrices, Similarity and unitary transformations, Diagonalization of	

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	... irreducible tensors,	matrices, Definition of Tensors, Contraction. Direct products, quotient rule, Pseudo tensors, Dual tensors, Levi Cevita symbol, irreducible tensors,	
FEBRUARY	**3. Second Order Differential Equations**: Partial differential equations of Physics, Separation of variables, Singular points, Ordinary series solution, Frobenius method, A second solution, Self adjoint differential equation, eigenfunctions and values, Boundary conditions, Hermitian operators and their properties, Schmidt orthogonalization, Completeness of functions,	**3. Second Order Differential Equations**: Partial differential equations of Physics, Separation of variables, Singular points, Ordinary series solution, Frobenius method, A second solution, Self adjoint differential equation, eigenfunctions and values, Boundary conditions, Hermitian operators and their properties, Schmidt orthogonalization, Completeness of functions,	Second semester exam started on Feb 8 th
MARCH	**4. Special functions**: Gamma function, Beta function, Delta function, Dirac delta function, Bessel functions of the first and second kinds, Generating function, Recurrence relation, Orthogonality, Neumann function, Spherical Bessel function, Legendre polynomials, Generating function, Recurrence relation, Rodrigues formula, Orthogonality, Associated Legendre polynomials, Spherical harmonics, Hermite polynomials, Laguerre polynomials,	**4. Special functions**: Gamma function, Beta function, Delta function, Dirac delta function, Bessel functions of the first and second kinds, Generating function, Recurrence relation, Orthogonality, Neumann function, Spherical Bessel function, Legendre polynomials, Generating function, Recurrence relation, Rodrigues formula, Orthogonality, Associated Legendre polynomials, Spherical harmonics, Hermite polynomials, Laguerre polynomials,	
APRIL	**5. Fourier Series:** General properties, Advantages, Uses of Fourier series, Properties of Fourier series, Fourier integral, Fourier transform, Properties, Inverse transform, Transform of the derivative, Convolution theorem, Laplace transform,	**5. Fourier Series:** General properties, Advantages, Uses of Fourier series, Properties of Fourier series, Fourier integral, Fourier transform, Properties, Inverse transform, Transform of the derivative, Convolution theorem, Laplace transform,	

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DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME: BSc **SEMESTER: EVEN**

COURSE:RELATIVISTIC MECHANICS AND ASTROPHYSICS **CLASS: VI SEMESTER**

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	**1. Special Relativity** The need for a new mode of thought – Michelson-Morley experiment – Postulates of Special Relativity – Galilean transformations – Lorentz transformations – Simultaneity – The order of events : Timelike and spacelike intervals – Lorentz length contraction – The orientation of a moving rod – Time dilation – Muon decay – Role of time dilation in an atomic clock - Relativistic transformation of velocity – Speed of light in a moving medium - Doppler effect – Doppler shift in sound – Relativistic Doppler effect – Doppler effect for an observer off the line of motion – Doppler navigation – Twin paradox – Relativistic Momentum and Energy – Momentum – Velocitydependence of the electron"s mass – Energy – Relativistic energy and momentum in an inelastic collision – The equivalence of mass and energy – Massless particles – Photoelectric effect – energy – Massless particles – Photoelectric effect – Radiation pressure of light – Photon picture of the Doppler effect – Does light travel at the velocity of light – The rest mass of the photon – Light from a pulsar	**Unit 1** **1. Special Relativity** The need for a new mode of thought – Michelson-Morley experiment – Postulates of Special Relativity – Galilean transformations – Lorentz transformations – Simultaneity – The order ofevents : Timelike and spacelike intervals – Lorentz length contraction – The orientation of a moving rod – Time dilation – Muon decay – Role of time dilation in an atomic clock – Relativistic transformation of velocity – Speed of light in a moving medium - Doppler effect – Doppler shift in sound – Relativistic Doppler effect – Doppler effect for an observer off the line of motion –Doppler navigation – Twin paradox – Relativistic Momentum and Energy – Momentum – Velocity dependence of the electron"s mass – Energy – Relativistic energy and momentum in an inelastic collision – The equivalence of mass and energy – Massless particles – Photoelectric effect –Radiation pressure of light – Photon picture of the Doppler effect – Does light travel at the velocity of light – The rest mass of the photon – Light from a pulsar	

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EMBER	2. General Relativity and Cosmology The principle of equivalence – General theory of relativity – Tests of general relativity – Stellar evolution – Nucleosynthesis – White dwarf stars – Neutron stars – Black holes – The expansion of the universe – Cosmic microwave background radiation – Dark matter – Cosmology and general relativity – The big bang cosmology – Formation of nuclei and atoms – Echoes of the big bang – The future of the universe	Unit 2 **2. General Relativity and Cosmology** The principle of equivalence – General theory of relativity – Tests of general relativity – Stellar evolution – Nucleosynthesis – White dwarf stars – Neutron stars – Black holes – The expansion of the universe – Cosmic microwave background radiation – Dark matter – Cosmology and general relativity – The big bang cosmology – Formation of nuclei and atoms – Echoes of the big bang – The future of the universe	
JANUARY	**3. Basic Tools of Astronomy** Stellar distance – Relationship between stellar parallax and distance – Brightness and luminosity –Relationship between Luminosity, brightness and distance Magnitudes – Apparent magnitude and brightness ratio – Relationship between apparent magnitude and absolute magnitude – Color and temperature of stars – Size and mass of stars – Relationship between flux, luminosity and radius – Star constituents – Stellar spectra – Stellar classification – Hertzsprung-Russell diagram – H-R diagram and stellar radius – H-R diagram and stellar luminosity – H-R diagram and stellar mass	**Unit 3** **3. Basic Tools of Astronomy** Stellar distance – Relationship between stellar parallax and distance – Brightness and luminosity –Relationship between Luminosity, brightness and distance Magnitudes – Apparent magnitude and brightness ratio – Relationship between apparent magnitude and absolute magnitude – Color and temperature of stars – Size and mass of stars – Relationship between flux, luminosity and radius – Star constituents – Stellar spectra – Stellar classification – Hertzsprung-Russell diagram – H-R diagram and stellar radius – H-R diagram and stellar luminosity – H-R diagram and stellar mass	
FEBRUARY	**4.Stellar Evolution** Birth of a Star – Pre-Main-Sequence evolution and the effect of mass – Galactic star clusters – Star formation triggers – The Sun – Internal structure of the sun – Proton-proton chain – Energy transport from the core to the surface – Binary stars – Masses of orbiting stars – Life times of mainsequence stars – Red giant stars - Helium burning – Helium flash – Star clusters, Red giants and the H-R diagram – Post-Main-Sequence star clusters : Globular clusters – Pulsating stars – Why do stars pulsate – Cepheid variables and the period-luminosity relationship Temperature and mass of Cepheids – Death of stars – Asymptotic	**4.Stellar Evolution** Birth of a Star – Pre-Main-Sequence evolution and the effect of mass – Galactic star clusters – Star formation triggers – The Sun – Internal structure of the sun – Proton-proton chain – Energy transport from the core to the surface – Binary stars – Masses of orbiting stars – Life times of mainsequence stars – Red giant stars - Helium burning – Helium flash – Star clusters, Red giants and the H-R diagram – Post-Main-Sequence star clusters : Globular clusters – Pulsating stars – Why do stars pulsate – Cepheid variables and the period-luminosity relationship Temperature and mass of Cepheids – Death of stars – Asymptotic giant branch – The end of an AGB star's life	

	giant branch – The end of an AGB star's life – Planetarynebulae	– Planetarynebulae – White dwarf stars – Electron degeneracy – Chandrasekhar limit – White dwarf evolution– White dwarf origins – High mass stars and nuclear burning – Formation of heavier elements – Supernova remnants – Supernova types – Pulsars and neutron stars – Black holes	
MARCH	White dwarf stars – Electron degeneracy – Chandrasekhar limit – White dwarf evolution– White dwarf origins – High mass stars and nuclear burning – Formation of heavier elements – Supernova remnants – Supernova types – Pulsars and neutron stars – Black holes **5. Galaxies** Galaxy types – Galaxy structure – Stellar populations – Hubble classification of galaxies – Observing galaxies – spiral, barred spiral, elliptical, lenticular galaxies – Active galaxies and active galactic Nuclei (AGN) – Gravitational lensing – Hubble"s law – Clusters of galaxies	**5. Galaxies** Galaxy types – Galaxy structure – Stellar populations – Hubble classification of galaxies – Observing galaxies – spiral, barred spiral, elliptical, lenticular galaxies – Active galaxies and active galactic Nuclei (AGN) – Gravitational lensing – Hubble"s law – Clusters of galaxies	

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DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME: BSc **SEMESTER:ODD**

COURSE: ELECTRODYNAMICS I **CLASS: III SEMESTER**

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
AUGUST	Vector Algebra: Vector operations - Vector algebra: Component form – Triple products – Position, Displacement and Separation vectors – How vectors transform. Differential Calculus: Ordinaryderivatives – GradientDivergence – Curl – Product rules – Second derivatives - Integral Calculus: Line integral, surface integral and volume integral -	**Unit 1 – Vector Calculus** Vector Algebra: Vector operations - Vector algebra: Component form – Triple products – Position, Displacement and Separation vectors - How vectors transform. Differential Calculus: Ordinaryderivatives – Gradient – The Del operator – Divergence – Curl – Product rules – Second derivatives. Integral Calculus: Line integral, surface integral and volume integral	III SEM started in August as per University academic calendar
SEPTEMBER	Fundamental theorem of calculus – Fundamental theorem for Gradients – Fundamental theorem for divergences: Gauss"s Divergence Theorem – Fundamental theorem for curls: Stoke"s theorem . Spherical polar coordinates – Cylindrical coordinates – Their relationship to Cartesian coordinates –	Fundamental theorem of calculus – Fundamental theorem for Gradients – Fundamental theorem for divergences: Gauss"s Divergence Theorem – Fundamental theorem for curls: Stoke"s theorem . Spherical polar coordinates – Cylindrical coordinates – Their relationship to Cartesian coordinates – Expressing differential displacement vector, differential area vectors, differential volume element, gradient operator, divergence operator and curl operator in spherical polar and cylindrical coordinates. Dirac delta function: – One-dimensional delta function – Three-dimensional delta function. Helmholtz theorem – Divergence-less vector fields – Curl-less vector fields – Potentials.	
OCTOBER	Expressing differential displacement vector, differential area vectors, differential volume element, gradient operator, divergence operator and curl operator in spherical polar and cylindrical coordinates. Dirac delta function: – One-dimensional delta function – Three-	**Unit 2 – Electrostatics** Electrostatic field – Coulomb"s law, Electric field, Continuous charge distributions - Divergence and curl of electrostatic field, Field lines and Gauss"s law, The divergence of **E**, Applications of Gauss law, Curl of **E** – Electric potential – Comments on potential, Poisson"s	

	dimensional delta function [illegible] Divergence-less vector field [illegible] vector fields Potentials.Electrostatic field [illegible] law, Electric field, Continuous charge distributions - Divergence and curl of electrostatic field.'	equation [illegible] localized charge distribution, Electrostatic boundary conditions	
NOVEMBER	Field lines and Gauss"s law. The divergence of **E**, Applications of Gauss law , Curl of **E**Electric potential – Comments on potential, Poisson"s equation and Laplace's equation. The potential of a localized charge distribution, Electrostatic boundary conditions – Work and energy in electrostatics, The work done in moving a charge, The energy of point charge distribution, The Energy of a continuous charge distribution, Comments on Electrostatic energy	Work and energy in electrostatics, The work done in moving a charge. The energy of point charge distribution, The Energy of a continuous charge distribution, Comments on Electrostatic energy –Conductors, Basic properties of conductors, Induced charges, The Surface charge on a conductor, The force on surface charge, Capacitors.	
DECEMBER	Conductors, Basic properties of conductors, Induced charges, The Surface charge on a conductor, The force on surface charge, Capacitors. Polarization – Dielectrics, Induced dipoles, Alignment of polar molecules, Polarization – The field of a polarized object , Bound charges, Physical interpretation of bound charges, The field inside a dielectric – The electric displacement – Gauss"s law in presence of dielectrics, Boundary conditions for **D** – Linear dielectrics, Susceptibility, Permittivity, Dielectric constant, Boundary value problems with linear dielectrics, Energy in dielectric systems, Forces on dielectrics.	**Unit 3 – Electric fields in matter**Polarization – Dielectrics, Induced dipoles, Alignment of polar molecules, Polarization – The field of a polarized object , Bound charges, Physical interpretation of bound charges, The field inside a dielectric – The electric displacement – Gauss"s law in presence of dielectrics, Boundary conditions for **D** – Linear dielectrics,- Susceptibility, Permittivity, Dielectric constant, Boundary value problems with linear dielectrics, Energy in dielectric systems, Forces on dielectrics.	

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DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME: BSc **SEMESTER:ODD**

COURSE: OPTICS **CLASS: V SEMESTER**

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
JUNE	**Fibre Optics**Optical fibre, Numerical aperture, step index fibre, pulse dispersion, graded index fibre, fibre optic sensors **Polarization** Huygen's explanation of double refraction, positive and negative uniaxial crystals, quarter and half wave plates, types of polarized light, production and analysis of plane, circularly and elliptically polarized light,	**Fibre Optics**Optical fibre, Numerical aperture, step index fibre, pulse dispersion, graded index fibre, fibre optic sensors **Polarization** Huygen's explanation of double refraction, positive and negative uniaxial crystals, quarter and half wave plates, types of polarized light, production and analysis of plane, circularly and elliptically polarized light, optical activity, Laurentz half shade polarimeter	
JULY	optical activity, Laurentz half shade polarimeter Fermat's Principle, verification of laws of reflection and refraction	Fermat's Principle, verification of laws of reflection and refraction **Interference by division of wave front** Superposition of two sinusoidal waves, Interference, coherence ,conditions for interference, the interference patterns, intensity distribution .Fresnel's two mirror arrangement, Fresnel's Biprism, Determination of λ and $d\lambda$ of Sodium Light	
AUGUST	Fresnel's two mirror arrangement, Fresnel's Biprism, Determination of λ and $d\lambda$ of Sodium Light	**Interference by division of amplitude**Interference by a plane film illuminated by a plane wave, cosine law, non reflecting films (the subsections excluded), interference by a film with two nonparallel reflecting surfaces, colours of thin films, Newton's rings, The Michelson interferometer, white light fringes	

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SEPTEMBER	The Michelson interferometer, white light fringes- **Fraunhofer Diffraction**Preliminaries, single slit diffraction pattern, diffraction by circular aperture, limit of resolution, two slit Fraunhofer diffraction pattern, N slit diffraction pattern, plane diffraction grating, resolving power.	**Fresnel Diffraction** Preliminaries, Fresnel half period zones, explanation of rectilinear propagation of light, zone plate	
OCTOBER	**Fresnel Diffraction** Preliminaries, Fresnel half period zones, explanation of rectilinear propagation of light, zone plate	**Holography**Principles of holography, theory of construction and reconstruction of Hologram, Applications of Holography	
NOVEMBER			III & IV Sem Uty exam & study leave
DECEMBER	**Holography**Principles of holography, theory of construction and reconstruction of Hologram, Applications of Holography		

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PG DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME: MSc

SEMESTER: EVEN

COURSE: STATISTICAL MECHANICS

CLASS: II SEM

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
JUNE	The macroscopic and the microscopic states – Contact between statistics and Thermodynamics: Expressing T, P and μ in terms of Ω – The classical Ideal gas - The entropy of mixing and the Gibbs paradox -	The macroscopic and the microscopic states – Contact between statistics and Thermodynamics: Expressing T, P and μ in terms of Ω – The classical Ideal gas - The entropy of mixing and the Gibbs paradox -	2 hrs per week
JULY	Phase space of a classical system - Liouville"s theorem and its consequences. The microcanonical ensemble – Examples: (1) Classical Ideal gas, (2) Linear harmonic oscillator – Quantum states and the phase space –	Phase space of a classical system - Liouville"s theorem and its consequences. The microcanonical ensemble -- Examples: (1) Classical Ideal gas, (2) Linear harmonic oscillator – Quantum states and the phase space –	
AUGUST	Equilibrium between a system and a heat reservoir- Physical significance of the various statistical quantities in the canonical ensemble- Alternative expressions for the partition function- Examples: (1) The classical systems: Ideal gas, (2) A system of harmonic oscillators,	Equilibrium between a system and a heat reservoir- Physical significance of the various statistical quantities in the canonical ensemble- Alternative expressions for the partition function- Examples: (1) The classical systems: Ideal gas, (2) A system of harmonic oscillators, (3) The statistics of paramagnetism - Energy fluctuations in the canonical ensemble	
SEPTEMBER	The statistics of paramagnetism - Energy fluctuations in the canonical ensembleEquipartition theorem - Virial theorem - Equilibrium between a system and a particle-energy reservoir- Physical significance of the various statistical quantities in the grand canonical ensemble- Example: Classical Ideal gas - Density and energy fluctuations in the grand canonical ensemble	Equipartition theorem - Virial theorem - Equilibrium between a system and a particle-energy reservoir- Physical significance of the various statistical quantities in the grand canonical ensemble- Example: Classical Ideal gas - Density and energy fluctuations in the grand canonical ensemble	

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DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME: **BSc** **SEMESTER:EVEN**

COURSE: **ELECTRODYNAMICS II** **CLASS: IV SEMESTER**

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
JANUARY	**Network theorems** Kirchhoff's laws, Voltage sign and current direction, Solution of simultaneous equations using determinants, Source conversion, Superposition theorem, Ideal equivalent circuits,Thevenin's theorem,	**Network theorems** Kirchhoff's laws, Voltage sign and current direction, Solution of simultaneous equations using determinants, Source conversion, Superposition theorem, Ideal equivalent circuits, Thevenin's theorem, Reciprocity theorem. Delta / Star transformation – Star / Delta transformation – Norton's theorem, Maximum powertransfer theorem.	
FEBRUARY	Reciprocity theorem, Delta / Star transformation – Star / Delta transformation – Norton's theorem, Maximum powertransfer theorem.**Transient currents** Types of transients – DC transient currents in R-L circuits – Short circuit current – Time constant – DC transient currents in R-C circuits – Double energy transients – Theory ofBG	**Transient currents** Types of transients – DC transient currents in R-L circuits – Short circuit current – Time constant – DC transient currents in R-C circuits – Double energy transients – Theory ofBG **AC circuits** A resonant circuit – Alternating current – Alternating current networks – Admittance and impedance – Power and energy in AC circuits	
MARCH	**AC circuits** A resonant circuit – Alternating current – Alternating current networks – Admittance and impedance – Power and energy in AC circuits	**Unit 1 – Electrodynamics** Electromotive force – Ohm's law, electromotive force, motional emf – Electromagnetic induction - Faraday's law, induced electric field, inductance, energy inmagnetic fields – Maxwell's equations – Electrodynamics before Maxwell, Maxwell's modification of Ampere's law, Maxwell's equations, Magnetic charge, Maxwell'sequations inside matter, Boundary conditions – Continuity equation – Poynting's theorem	II Sem Uty exam

APRIL	Electromotive force – Ohm's law, electromotive force, motional emf – Electromagnetic induction - Faraday's law, induced electric field, inductance, energy inmagnetic fields –Maxwell's equations – Electrodynamics before Maxwell, Maxwell's modification of Ampere's law, Maxwell's equations, Magnetic charge, Maxwell'sequations inside matter, Boundary conditions – Continuity equation – Poynting's theorem		Special class

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DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME: BSc

SEMESTER:EVEN

COURSE: NANOSCIENCE & TECHNOLOGY

CLASS: VI SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
DECEMBER	Length scales in Physics- nanometer- Nanostructures: Zero, One Two and Three dimensional nanostructuresBand Structure and Density of States at nanoscale: Energy Bands, Density of States at low dimensional structures.**Electrical transport in nanostructure:** Electrical conduction in metals, The free electron model. Conduction in insulators/ionic crystals - Electron transport in semiconductors	Length scales in Physics- nanometer- Nanostructures: Zero, One Two and Three dimensional nanostructuresBand Structure and Density of States at nanoscale: Energy Bands, Density of States at low dimensional structures.**Electrical transport in nanostructure:** Electrical conduction in metals, The free electron model. Conduction in insulators/ionic crystals - Electron transport in semiconductors - Various conduction mechanisms in 3D (bulk), 2D(thin film) and low dimensional systems: Thermionic emission, field enhanced thermionic emission (Schottky effect), Field assisted thermionic emission from traps (Poole-Frenkel effect), Arrhenius type activated conduction, Variable range, Hopping conduction, Polaron conduction.	
JANUARY	Various conduction mechanisms in 3D (bulk), 2D(thin film) and low dimensional systems: Thermionic emission, field enhanced thermionic emission (Schottky effect), Field assisted thermionic emission from traps (Poole-Frenkel effect), Arrhenius type activated conduction, Variable range, Hopping conduction, Polaron conduction.**Introductory Quantum Mechanics for Nanoscience:** Size effects in small systems,	**Introductory Quantum Mechanics for Nanoscience:** Size effects in small systems, Quantum behaviors of nanometric world: Applications of Schrodinger equation - infinite potential well, potential step, potential box; trapped particle in 3D (nanodot), electron trapped in 2D plane (nanosheet), electrons moving in ID (nanowire, nanorod, nanobelt), Excitons, Quantum confinement effect in nanomaterials	V Sem exam

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MES ASMABI COLLEGE, P.VEMBALLUR
DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME : BSc

SEMESTER: ODD

COURSE : QUANTUM MECHANICS

CLASS: V SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
JUNE	**1. Particle like Properties of Electromagnetic Radiation 8 Hours** Review of electromagnetic waves – Photoelectric effect – Blackbody radiation – Compton effect – Other photon processes – What is a photon?	**1. Particle like Properties of Electromagnetic Radiation 8 Hours** Review of electromagnetic waves – Photoelectric effect – Blackbody radiation – Compton effect – Other photon processes – What is a photon?	
JULY	**2. Rutherford-Bohr Model of the Atom 10 Hours** Basic properties of atoms – Thomson model – Rutherford nuclear atom – Line spectra – Bohr model – Frank-Hertz experiment – Correspondence principle – Deficiencies of Bohr model	**2. Rutherford-Bohr Model of the Atom 10 Hours** Basic properties of atoms – Thomson model – Rutherford nuclear atom – Line spectra – Bohr model – Frank-Hertz experiment – Correspondence principle – Deficiencies of Bohr model	
AUGUST	**3. Wavelike Properties of Particles 10 Hours** De Broglie hypothesis - Uncertainty relationships for classical waves – Heisenberg uncertainty relationships – Wave packets - Probability and randomness – Probability amplitude	**3. Wavelike Properties of Particles 10 Hours** De Broglie hypothesis - Uncertainty relationships for classical waves – Heisenberg uncertainty relationships – Wave packets - Probability and randomness – Probability amplitude	
SEPTEMBER	**4. The Schrodinger Equation 16 Hours**	**4. The Schrodinger Equation 16 Hours**	

	Justification of the Schrodinger equation – The Schrodinger recipe – Probabilities and normalization – Applications – Free particle, Particle in a box (one dimension), Particle in a box 35 (two dimensions). Simple harmonic oscillator – Time dependence – Potential energy steps and potential energy barriers	Justification of the Schrodinger equation – The Schrodinger recipe – Probabilities and normalization – Applications – Free particle, Particle in a box (one dimension), Particle in a box 35 (two dimensions). Simple harmonic oscillator – Time dependence – Potential energy steps and potential energy barriers	
OCTOBER	**5. Hydrogen Atom in Wave Mechanics 10 Hours** Schrodinger equation in spherical coordinates – Hydrogen atom wave functions – Radial probability densities – Angular momentum and probability densities – Intrinsic spin – Energy levels and spectroscopic notation – Zeeman effect – Fine structure	**5. Hydrogen Atom in Wave Mechanics 10 Hours** Schrodinger equation in spherical coordinates – Hydrogen atom wave functions – Radial probability densities – Angular momentum and probability densities – Intrinsic spin – Energy levels and spectroscopic notation – Zeeman effect – Fine structure	

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DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME: MSc

SEMESTER: ODD

COURSE:NUCLEAR AND PARTICLE PHYSICS

CLASS: III SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	**1. Nuclear Forces** Properties of the nucleus, size, binding energy, angular momentum , The deuteron and two- nucleon scattering experimental data, Simple theory of the deuteron structure, Low energy n-p scattering, characteristics of nuclear forces, Spin dependence, Tensor force, Scattering cross sections, Partial waves, Phase shift. Singlet and triplet potentials, Effective range theory, p-p scattering.	**1. Nuclear Forces** Properties of the nucleus, size, binding energy, angular momentum , The deuteron and two- nucleon scattering experimental data, Simple theory of the deuteron structure, Low energy n-p scattering, characteristics of nuclear forces, Spin dependence, Tensor force, Scattering cross sections, Partial waves, Phase shift, Singlet and triplet potentials, Effective range theory, p-p scattering.	
DECEMBER	**2. Nuclear Decay** Basics of alpha decay and theory of alpha emission, Beta decay, Energetics of beta decay, Fermi theory of beta decay, Comparative half-life, Allowed and forbidden transitions, Selection rules, Parity violation in beta decay. Neutrino. Energetics of Gamma Decay, Multipole moments, Decay rate, Angular momentum and parity selection rules, Internal conversion, Life times.	**2. Nuclear Decay** Basics of alpha decay and theory of alpha emission, Beta decay, Energetics of beta decay, Fermi theory of beta decay, Comparative half-life, Allowed and forbidden transitions, Selection rules, Parity violation in beta decay. Neutrino. Energetics of Gamma Decay, Multipole moments, Decay rate, Angular momentum and parity selection rules, Internal conversion, Life times.	
JANUARY	**3. Nuclear Models, Fission and Fusion** Shell model potential, Spin-orbit potential, Magnetic dipole moments, Electric quadruple moments, Valence Nucleons, Collective structure, Nuclear vibrations, Nuclear rotations, Liquid drop Model, Semiempirical Mass formula, Energetics of Fission	**3. Nuclear Models, Fission and Fusion** Shell model potential, Spin-orbit potential, Magnetic dipole moments, Electric quadruple moments, Valence Nucleons, Collective structure, Nuclear vibrations, Nuclear rotations, Liquid drop Model, Semiempirical Mass formula, Energetics of Fission process,	

	process, Controlled Fission reactions, Fusion process, Characteristics of fusion, solar fusion, Controlled fusion reactors	Controlled Fission reactions, Fusion process, Characteristics of fusion, solar fusion, Controlled fusion reactors	
FEBRUARY	**4. Nuclear Radiation Detectors and Nuclear Electronics** Gas detectors – Ionization chamber, Proportional counter and G M counter, Scintillation detector, Photomultiplier Tube (PMT), Semiconductor detectors – Ge(Li), Si(Li) and surface barrier detectors, Preamplifiers, Amplifiers, Single channel analyzers, Multi- channel analyzers, counting statistics, energy measurements.	**4. Nuclear Radiation Detectors and Nuclear Electronics** Gas detectors – Ionization chamber, Proportional counter and G M counter, Scintillation detector, Photomultiplier Tube (PMT), Semiconductor detectors – Ge(Li), Si(Li) and surface barrier detectors, Preamplifiers, Amplifiers, Single channel analyzers, Multi-channel analyzers, counting statistics, energy measurements.	
MARCH	**5. Particle Physics** Four basic forces - Gravitational, Electromagnetic, Weak and Strong - Relative strengths, classification of particles, Yukawa's theory, Conservation of energy and masses, Electric charges, Conservation of angular momentum, Baryon and lepton numbers, Conservation of strangeness, Conservation of isospin and its components, Conservation of parity, Charge conjugation, CP violation, time reversal and CPT theorem. Extremely short lived particles, Resonances - detecting methods and experiments, Internal symmetry, The Sakata model, SU(3), The eight fold way, Gellmann and Okubo mass formula, Quarks and quark model, Confined quarks, Experimental evidence, Coloured quarks.	**5. Particle Physics** Four basic forces - Gravitational, Electromagnetic, Weak and Strong - Relative strengths, classification of particles, Yukawa's theory, Conservation of energy and masses, Electric charges, Conservation of angular momentum, Baryon and lepton numbers, Conservation of strangeness, Conservation of isospin and its components, Conservation of parity, Charge conjugation, CP violation, time reversal and CPT theorem. Extremely short lived particles, Resonances - detecting methods and experiments, Internal symmetry, The Sakata model, SU(3), The eight fold way, Gellmann and Okubo mass formula, Quarks and quark model, Confined quarks, Experimental evidence, Coloured quarks.	

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DEPARTMENT OF PHYSICS

TEACHING PLAN 2020-21

PROGRAMME: MSc **SEMESTER:ODD**

COURSE: **CLASSICAL MECHANICS** **CLASS: I SEMESTER**

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	**1. Lagrangian and Hamiltonian Formulation:** Constraints and Generalized coordinates, D'Alembert's principle and Lagrange's equation	**1. Lagrangian and Hamiltonian Formulation:** Constraints and Generalized coordinates, D'Alembert's principle and Lagrange's equation, Velocity dependent potentials, Simple applications, Hamilton's Principle, Lagrange's equation from Hamilton's principle, Kepler problem, Scattering in a central force field, Transformation to lab coordinates, Legendre Transformation, Hamilton's canonical equations, Principle of least action, Canonical transformations,	
DECEMBER	Velocity dependent potentials, Simple applications, Hamilton's Principle, Lagrange's equation from Hamilton's principle, Kepler problem, Scattering in a central force field, Transformation to lab coordinates, Legendre Transformation, Hamilton's canonical equations, Principle of least action, Canonical transformations	**1. Lagrangian and Hamiltonian Formulation:** Constraints and Generalized coordinates, D'Alembert's principle and Lagrange's equation, Velocity dependent potentials, Simple applications, Hamilton's Principle, Lagrange's equation from Hamilton's principle, Kepler problem, Scattering in a central force field, Transformation to lab coordinates, Legendre Transformation, Hamilton's canonical equations, Principle of least action, Canonical transformations,	
JANUARY	**2. The classical background of quantum mechanics:** Equations of canonical transformations, Examples, Poisson brackets and other canonical invariants, Equation of motion in Poisson bracket form, Angular momentum Poisson brackets, Hamilton-Jacobi equation, Hamilton's principal and characteristic	**2. The classical background of quantum mechanics:** Equations of canonical transformations, Examples, Poisson brackets and other canonical invariants, Equation of motion in Poisson bracket form, Angular momentum Poisson brackets, Hamilton-Jacobi equation, Hamilton's principal and characteristic function, H-J	

	function, H-J equation for the linear harmonic oscillator, Separation of variables, Action-angle variables, H-J formulation of the Kepler problem, H-J equation and the Schrodinger equation.	equation for the linear harmonic oscillator, Separation of variables, Action-angle variables, H-J formulation of the Kepler problem, H-J equation and the Schrodinger equation.	
FEBRUARY	3. **The Kinematics and Dynamics of Rigid Bodies**: Space-fixed and body-fixed systems of coordinates, Description of rigid body motion in terms of direction cosines and Euler angles, Infinitesimal rotation, Rate of change of a vector, Centrifugal and Coriolis forces, Moment of inertia tensor, Euler's equation of motion, Force free motion of rigid bodies.	3. **The Kinematics and Dynamics of Rigid Bodies**: Space-fixed and body-fixed systems of coordinates, Description of rigid body motion in terms of direction cosines and Euler angles, Infinitesimal rotation, Rate of change of a vector, Centrifugal and Coriolis forces, Moment of inertia tensor, Euler's equation of motion, Force free motion of rigid bodies.	
MARCH	4. **Small Oscillations**: Formulation of the problem, Eigenvalue equation, Eigenvectors and Eigenvalues, Orthogonality, Principal axis transformation, Frequencies of free vibrations, Normal coordinates, Free vibrations of a linear tri atomic molecule	4. **Small Oscillations**: Formulation of the problem, Eigenvalue equation, Eigenvectors and Eigenvalues, Orthogonality, Principal axis transformation, Frequencies of free vibrations, Normal coordinates, Free vibrations of a linear tri atomic molecule	
APRIL	5. **Nonlinear Equations and Chaos**: Introduction, Singular points of trajectories, Nonlinear oscillations, Limit cycles, Chaos: Logistic map, Definitions, Fixed points, Period doubling, Universality.	5. **Nonlinear Equations and Chaos**: Introduction, Singular points of trajectories, Nonlinear oscillations, Limit cycles, Chaos: Logistic map, Definitions, Fixed points, Period doubling, Universality.	

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DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME : BSc

SEMESTER: EVEN

COURSE : THERMODYNAMICS

CLASS: VI SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
DECEMBER	**Zeroth Law and First Law of Thermodynamics** Macroscopic point of view – Microscopic point of view – Macroscopic versus Microscopic points of view – Scope of Thermodynamics – Thermal equilibrium and Zeroth Law – Concept of temperature – Ideal-Gas temperature – Thermodynamic equilibrium – Equation of state – Hydrostatic systems – Intensive and extensive coordinates – Work – Quasi-static process – Work in changing the volume of a hydrostatic system – PV diagram – Hydrostatic work depends on the path– Calculation of work for quasi-static processes – Work and Heat – Adiabatic work – Internal energy function – Mathematical formulation of First Law – Concept of Heat – Differential form of the First Law – Heat capacity – Specific heat of water; the Calorie – Quasi-static flow of heat; Heat reservoir	**Unit 1 – Zeroth Law and First Law of Thermodynamics** Macroscopic point of view – Microscopic point of view – Macroscopic versus Microscopic points of view – Scope of Thermodynamics – Thermal equilibrium and Zeroth Law – Concept of temperature – Ideal-Gas temperature – Thermodynamic equilibrium – Equation of state – Hydrostatic systems – Intensive and extensive coordinates – Work – Quasi-static process – Work in changing the volume of a hydrostatic system – PV diagram – Hydrostatic work depends on the path – Calculation of work for quasi-static processes – Work and Heat – Adiabatic work – Internal energy function – Mathematical formulation of First Law – Concept of Heat – Differential form of the First Law – Heat capacity – Specific heat of water; the Calorie – Quasi-static flow of heat; Heat reservoir	
JANUARY	**Ideal Gas** Equation of state of a gas – Internal energy of a real gas – Ideal gas – Experimental determination of heat capacities – Quasi-static adiabatic process – The microscopic point of view – Kinetic theory of the ideal gas **Second Law of Thermodynamics**	**Unit 2 – Ideal Gas** Equation of state of a gas – Internal energy of a real gas – Ideal gas – Experimental determination of heat capacities – Quasi-static adiabatic process – The microscopic point of view – Kinetic theory of the ideal gas **Unit 3 – Second Law of Thermodynamics** Conversion of work into heat and vice versa – Heat engine;	

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	Conversion of work into heat and vice versa Heat engine; Kelvin-Planck statement of the Second Law – Refrigerator; Clausius statement of the Second Law – Equivalence of Kelvin-Planck and Clausius statements – Reversibility and Irreversibility – Conditions for reversibility – Carnot engine and Carnot cycle	Kelvin-Planck statement of the Second Law – Refrigerator; Clausius" statement of the Second Law – Equivalence of Kelvin-Planck and Clausius statements – Reversibility and Irreversibility – Conditions for reversibility – Carnot engine and Carnot cycle – Carnot refrigerator – Carnot"s Theorem and corollary – Thermodynamic temperature scale – Absolute zero and Carnot efficiency – Equality of ideal-gas and thermodynamic temperatures	
FEBRUARY	Carnot refrigerator – Carnot"s Theorem and corollary – Thermodynamic temperature scale – Absolute zero and Carnot efficiency – Equality of ideal-gas and thermodynamic temperatures **Entropy** Reversible part of the Second Law – Entropy – Entropy of the ideal gas – TS diagram – Entropy and reversibility – Entropy and irreversibility – Irreversible part of the Second Law – Heat and entropy in irreversible processes – Principle of increase of entropy – Applications of the Entropy Principle – Entropy and disorder – Exact differentials	**Entropy** Reversible part of the Second Law – Entropy – Entropy of the ideal gas – TS diagram – Entropy and reversibility – Entropy and irreversibility – Irreversible part of the Second Law – Heat and entropy in irreversible processes – Principle of increase of entropy – Applications of the Entropy Principle – Entropy and disorder – Exact differentials	
MARCH	**Thermodynamic Potentials and Phase Transitions** Characteristic functions – Enthalpy – Joule-Thomson expansion – Helmholtz and Gibbs functions – Condition for an exact differential – Maxwell"s relations – TdS equations – PV diagram for a pure substance – PT diagram for a pure substance; Phase diagram – First-order phase transitions and Clausius-Clapeyron equation – Clausius-Clapeyron equation and phase diagrams	**Unit 5 – Thermodynamic Potentials and Phase Transitions** Characteristic functions – Enthalpy – Joule-Thomson expansion – Helmholtz and Gibbs functions – Condition for an exact differential – Maxwell"s relations – TdS equations – PV diagram for a pure substance – PT diagram for a pure substance; Phase diagram – First-order phase transitions and Clausius-Clapeyron equation – Clausius-Clapeyron equation and phase diagrams	

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TEACHING PLAN 2021-22

PROGRAMME : MSc — **SEMESTER: ODD**

COURSE : ELECTRODYNAMICS AND PLASMA PHYSICS — **CLASS : I SEMESTER**

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	**Time varying fields and Maxwell's equations:** Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and their solutions, Time harmonic fields, Multipole expansion of electric scalar potential and magnetic vector potential, Enough exercises.	**Time varying fields and Maxwell's equations:** Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and their solutions, Time harmonic fields, Multipole expansion of electric scalar potential and magnetic vector potential, Enough exercises.	
DECEMBER	**Plane electromagnetic waves:** Plane waves in lossless media, Plane waves in lossy media, Group velocity, Flow of electromagnetic power and the Poynting vector, Normal incidence at a plane conducting boundary, Oblique incidence at a plane conducting boundary, Normal incidence at a plane dielectric boundary, Oblique incidence at a plane dielectric boundary, Enough exercises.	**Plane electromagnetic waves:** Plane waves in lossless media, Plane waves in lossy media, Group velocity, Flow of electromagnetic power and the Poynting vector, Normal incidence at a plane conducting boundary, Oblique incidence at a plane conducting boundary, Normal incidence at a plane dielectric boundary, Oblique incidence at a plane dielectric boundary, Enough exercises.	

JANUARY	**Transmission lines, Wave guides and cavity resonators:** Transverse electromagnetic waves along a parallel plane transmission line, General transmission line equations, Wave characteristics on finite transmission lines, General wave behaviour along uniform guiding structures, Rectangular wave guides, Cavity resonators (Qualitative ideas only), Enough exercises.	**Transmission lines, Wave guides and cavity resonators:** Transverse electromagnetic waves along a parallel plane transmission line, General transmission line equations, Wave characteristics on finite transmission lines, General wave behaviour along uniform guiding structures, Rectangular wave guides, Cavity resonators (Qualitative ideas only), Enough exercises.	
FEBRUARY	**Relativistic Electrodynamics:** Magnetism as a relativistic phenomenon, Transformation of the field, Electric field of a point charge moving uniformly, Electromagnetic field tensor, Electrodynamics in tensor notation, Potential formulation of relativistic electrodynamics, Enough exercises	**Relativistic Electrodynamics:** Magnetism as a relativistic phenomenon, Transformation of the field, Electric field of a point charge moving uniformly, Electromagnetic field tensor, Electrodynamics in tensor notation, Potential formulation of relativistic electrodynamics, Enough exercises	
MARCH	**Plasma Physics:** Plasma - Definition, concepts of plasma parameter, Debye shielding, Motion of charged particles in an electromagnetic field - Uniform electric and magnetic fields, Boltzmann and Vlasov equations, their moments - Fluid equations, Plasma oscillations, Enough exercises	**Plasma Physics:** Plasma - Definition, concepts of plasma parameter, Debye shielding, Motion of charged particles in an electromagnetic field - Uniform electric and magnetic fields, Boltzmann and Vlasov equations, their moments-Fluid equations, Plasma oscillations, Enough exercises	

TEACHER: NISHA P K

HOD: Dr Sheena P A

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DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME : BSc

SEMESTER : EVEN

COURSE : SOLID STATE PHYSICS

CLASS : VI SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	**Basic Elements of Spectroscopy** Quantum of Energy-Regions of Spectrum-Representation of Spectrum-Basic Elements of Practical Spectroscopy-Signal to Noise Ratio-Resolving Power-Width & Intensity of Spectral Transitions	. **Basic Elements of Spectroscopy** Quantum of Energy-Regions of Spectrum-Representation of Spectrum-Basic Elements of Practical Spectroscopy-Signal to Noise Ratio-Resolving Power-Width & Intensity of Spectral Transitions	
DECEMBER	**Microwave Spectroscopy** Classification of Molecules-Interaction of Radiation with Rotating Molecules-Rotational Spectrum of Rigid Diatomic Molecule-Example of CO Selection Rule-Intensity-Spectrum of non – rigid Rotator **Infra Red Spectroscopy:** Energy of a diatomic molecule-Simple harmonic oscillator-Anharmonic oscillator-Morse curve-Selection rules and spectra-the spectrum of HCl-Hot bands-Diatomic vibrating rotator-Born oppenheimer approximation	**Microwave Spectroscopy** Classification of Molecules-Interaction of Radiation with Rotating Molecules-Rotational Spectrum of Rigid Diatomic Molecule-Example of CO Selection Rule-Intensity-Spectrum of non –rigid Rotator. **Infra Red Spectroscopy:** Energy of a diatomic molecule-Simple harmonic oscillator-Anharmonic oscillator-Morse curve-Selection rules and spectra-the spectrum of HCl-Hot bands-Diatomic vibrating rotator-Born oppenheimer approximation	

JANUARY	**Solid state physics:** Lattice Point & Space Lattice-Basis and crystal structure, unit cells and lattice Parameters, Unit cells v/s primitive cells, Crystal systems, crystal symmetry. The 23 symmetry elements in a cubical crystal, rotation axis and inversion. Symmetry elements, Bravais space lattices-metallic crystal structure , sodium chloride, diamond, zinc sulphide, hexagonal and closed packed structure, directions, planes and Miller indices. **X-ray Diffraction:** Bragg's law – Braggs X-ray spectrometer- Powder Crystal method	**Solid state physics:** Lattice Point & Space Lattice-Basis and crystal structure, unit cells and lattice Parameters, Unit cells v/s primitive cells, Crystal systems, crystal symmetry. The 23 symmetry elements in a cubical crystal, rotation axis and inversion. Symmetry elements, Bravais space lattices-metallic crystal structure , sodium chloride, diamond, zinc sulphide, hexagonal and closed packed structure, directions, planes and Miller indices. **X-ray Diffraction:** Bragg's law – Braggs X-ray spectrometer- Powder Crystal method	
FEBRUARY	**Photonics:** Induced Absorption-Spontaneous Emission & Stimulated Emission-Einstein Coefficients Principle of Laser-Population inversion-Pumping-Properties of Laser-Types of LaserPrinciple & working of Ruby laser, Helium Neon Laser & Semiconductor Laser- -Yag Lasers - Application of Lasers. Raman Effect, Elements of Quantum theory & Applications	**Photonics:** Induced Absorption-Spontaneous Emission & Stimulated Emission-Einstein Coefficients Principle of Laser-Population inversion-Pumping-Properties of Laser-Types of LaserPrinciple & working of Ruby laser, Helium Neon Laser & Semiconductor Laser- -Yag Lasers - Application of Lasers..Raman Effect, Elements of Quantum theory & Applications	
MARCH	**Statistical Physics:** Statistical analysis-Classical versus quantum statistics-distribution of molecular speeds-Maxwell Boltzmann distribution-Quantum statistics-Applications of Bose Einstein statistics-Black body radiation-Application of Fermi Dirac statistics.	**Statistical Physics:** Statistical analysis-Classical versus quantum statistics-distribution of molecular speeds-Maxwell Boltzmann distribution-Quantum statistics-Applications of Bose Einstein statistics-Black body radiation-Application of Fermi Dirac statistics.	

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TEACHER: Ashitha.T.M [signature]

MES ASMABI COLLEGE, P.VEMBALLUR
PG DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME : MSc

SEMESTER: ODD

COURSE : SOLID STATE PHYSICS

CLASS : III SEMESTER

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	**Crystal Structure and binding:** Symmetry elements of a crystal, Types of space lattices, Miller indices, Diamond Structure, NaCl Structure, BCC, FCC,HCP structures with examples,	**Crystal Structure and binding:** Symmetry elements of a crystal, Types of space lattices, Miller indices, Diamond Structure, NaCl Structure, BCC, FCC,HCP structures with examples, Description of X-ray diffraction using reciprocal lattice, Brillouin zones, Vander Waals interaction, Cohesive energy of inert gas crystals, Madelung interaction, Cohesive energy of ionic crystals, Covalent bonding, Metallic bonding, Hydrogen-bonded crystals	
DECEMBER	Description of X-ray diffraction using reciprocal lattice, Brillouin zones, Vander Waals interaction, Cohesive energy of inert gas crystals, Madelung interaction, Cohesive energy of ionic crystals, Covalent bonding, Metallic bonding, Hydrogen-bonded crystals **Lattice Vibrations:** Vibrations of monatomic and diatomic lattices, Quantization of lattice vibrations, Inelastic scattering of neutrons, Einstein and Debye models of specific heat, Thermal conductivity, Effect of	**Lattice Vibrations:** Vibrations of monatomic and diatomic lattices, Quantization of lattice vibrations, Inelastic scattering of neutrons, Einstein and Debye models of specific heat, Thermal conductivity, Effect of imperfection	

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	imperfection		
JANUARY	**Electron States and Semiconductors:** Free electron gas in three dimensions, Specific heat of metals, Sommerfeld theory of electrical conductivity, Wiedemann-Franz law, Hall effect, Nearly free electron model and formation of energy bands, Bloch functions, Kronig Penny model, Formation of energy gap at Brillouin zone boundaries, Number of orbitals in a band, Equation of motion of electrons in energy bands	**Electron States and Semiconductors:** Free electron gas in three dimensions, Specific heat of metals, Sommerfeld theory of electrical conductivity, Wiedemann-Franz law, Hall effect, Nearly free electron model and formation of energy bands, Bloch functions, Kronig Penny model, Formation of energy gap at Brillouin zone boundaries, Number of orbitals in a band, Equation of motion of electrons in energy bands, Properties of holes, Effective mass of carriers, Intrinsic carrier concentration, Hydrogenic model of donor and acceptor states. Direct band gap and indirect band gap semiconductors	2^{ND} Semester exam started 2^{nd} week.
FEBRUARY	Properties of holes, Effective mass of carriers, Intrinsic carrier concentration, Hydrogenic model of donor and acceptor states. Direct band gap and indirect band gap semiconductors **Dielectric, Ferroelectric and magnetic properties:** Theory of Dielectrics: polarization, Dielectric constant, Local Electric field, Dielectric polarisability, Polarisation from Dipole orientation, Ferroelectric crystals, Order-disorder type of ferroelectrics, Properties of Ba Ti O3, Polarisation catastrophe, Displasive type ferroelectrics, Landau theory of ferroelectric phase transitions, Ferroelectric domain, Antiferroelectricity, Piezoelectricity, Applications of Piezoelectric Crystals, Diamagnetism and Paramagnetism: Langevin's theory of diamagnetism, Langevin's theory of paramagnetism, theory of Atomic magnetic	**Dielectric, Ferroelectric and magnetic properties:** Theory of Dielectrics: polarization, Dielectric constant, Local Electric field, Dielectric polarisability, Polarisation from Dipole orientation, Ferroelectric crystals, Order-disorder type of ferroelectrics, Properties of Ba Ti O3, Polarisation catastrophe, Displasive type ferroelectrics, Landau theory of ferroelectric phase transitions, Ferroelectric domain, Antiferroelectricity, Piezoelectricity, Applications of Piezoelectric Crystals, Diamagnetism and Paramagnetism: Langevin's theory of diamagnetism, Langevin's theory of paramagnetism, theory of Atomic magnetic moment, Hund"s rule, Quantum theory of magnetic Susceptibility Ferro, Anti and Ferri magnetism: Weiss theory of ferromagnetism, Ferromagnetic domains, Neel Model of Antiferromagnetism and Ferrimagnetism, Spin waves, Magnons in Ferromagnets (qualitative)	

	+moment,		
MARCH	Hund"s rule, Quantum theory of magnetic Susceptibility Ferro, Anti and Ferri magnetism: Weiss theory of ferromagnetism, Ferromagnetic domains, Neel Model of Antiferromagnetism and Ferrimagnetism, Spin waves, Magnons in Ferromagnets (qualitative) **Superconductivity:** Meissner effect, Type I and Type II superconductors, energy gap Isotope effect, London equation and penetration of magnetic field, Cooper pairs and the B C S ground state (qualitative, Flux quantization, Single particle tunneling, DC and AC Josepheson effects, High Tc Superconductors(qualitative) description of cuprates,	**Superconductivity:** Meissner effect, Type I and Type II superconductors, energy gap Isotope effect, London equation and penetration of magnetic field, Cooper pairs and the B C S ground state (qualitative, Flux quantization, Single particle tunneling, DC and AC Josepheson effects, High Tc Superconductors(qualitative) description of cuprates, Enough exercises.	

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MES ASMABI COLLEGE, P.VEMBALLUR
DEPARTMENT OF PHYSICS

TEACHING PLAN 2021-22

PROGRAMME : MSc **SEMESTER : ODD**

COURSE : ELECTRONICS **CLASS : I SEMESTER**

MONTH	MODULE COVERED	MODULE AS PER SYLLABUS	REMARKS
NOVEMBER	**Operational Amplifier** Differential amplifiers, analysis of Emitter coupled differential amplifiers. OPAMP parameters: Open loop gain, CMRR, error currents and error voltages, input and output impedances, slew rate and UGB. Frequency response, poles and zeros; transfer functions (derivation not required), expression for phase angle. Need for compensation, dominant pole, pole zero and lead compensation	**Operational Amplifier** Differential amplifiers, analysis of Emitter coupled differential amplifiers, OPAMP parameters: Open loop gain, CMRR, error currents and error voltages, input and output impedances, slew rate and UGB. Frequency response, poles and zeros; transfer functions (derivation not required), expression for phase angle. Need for compensation, dominant pole, pole zero and lead compensation	
DECEMBER	**OPAMP Applications** Closed loop inverting, non-inverting and difference OPAMP configurations and their characteristics; OPAMP as inverter, scale changer, summer, V to I converter, practical integrator & differentiator, active low pass , high pass and band pass Butterworth filters, band pass filter with multiple feedback, OPAMP notch filter, OPAMP Wien bridge oscillator, OPAMP astable and monostable multivibrators, Schmid triggers.	. **OPAMP Applications** Closed loop inverting, non-inverting and difference OPAMP configurations and their characteristics; OPAMP as inverter, scale changer, summer, V to I converter, practical integrator & differentiator, active low pass , high pass and band pass Butterworth filters, band pass filter with multiple feedback, OPAMP notch filter, OPAMP Wien bridge oscillator, OPAMP astable and monostable multivibrators, Schmid triggers.	
JANUARY	**Digital Electronics** Minimization of Boolean functions using Karnaugh map and representation using logic gates, JK and MS JK and D flip-flops, shift registers using D and JK flip flops and their operations, shift registers as counters,	**Digital Electronics** Minimization of Boolean functions using Karnaugh map and representation using logic gates, JK and MS JK and D flip-flops, shift registers using D and JK flip flops and their operations, shift registers as counters, ring counter, design of	

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	ring counter, design of synchronous and asynchronous counters, state diagram, cascade counters, basic idea of static and dynamic RAM, basics of charge coupled devices, R-2R ladder D/A converter, Introduction to 8 bit microprocessor; internal architecture of Intel 8085 register organisation	synchronous and asynchronous counters, state diagram, cascade counters, basic idea of static and dynamic RAM, basics of charge coupled devices. R-2R ladder D/A converter, Introduction to 8 bit microprocessor; internal architecture of Intel 8085 register organisation	
FEBRUARY	**Microwave and Photonic devices** Tunnel diode, construction and characteristics, negative differential resistance and device operation, radiative transitions and optical absorption, Light emitting diodes (LED) – visible and IR, semiconductor lasers, construction and operation, population inversion, carrier and optical confinement, optical cavity and feedback, threshold current density. Photodetectors – Photoconductor (Light dependent resistor- LDR) and photodiode, p-n junction solar cells - short circuit current, fill factor and efficiency	**Microwave and Photonic devices** Tunnel diode, construction and characteristics, negative differential resistance and device operation, radiative transitions and optical absorption, Light emitting diodes (LED) – visible and IR, semiconductor lasers, construction and operation, population inversion, carrier and optical confinement, optical cavity and feedback, threshold current density. Photodetectors – Photoconductor (Light dependent resistor- LDR) and photodiode; p-n junction solar cells - short circuit current, fill factor and efficiency	
MARCH	**Field effect transistors** V-I characteristics of JFETs and device operation, construction of depletion and enhancement MOSFETs, VI characteristics and device operation. Biasing of FETs, FETs as VVR and its applications, small signal model of FETs, analysis of Common Source and Common Drain amplifiers at low and high frequencies, MOSFET as a switch, CMOS and digital MOSFET gates (NOT, NAND, NOR)	**Field effect transistors** V-I characteristics of JFETs and device operation, construction of depletion and enhancement MOSFETs, VI characteristics and device operation. Biasing of FETs, FETs as VVR and its applications, small signal model of FETs, analysis of Common Source and Common Drain amplifiers at low and high frequencies, MOSFET as a switch, CMOS and digital MOSFET gates (NOT, NAND, NOR)	I semester University exam started on May 30

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