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DEGLOOR COLLEGE,DEGLOOR

DEPT. OF PHYSICS

YEAR 2023-24

SEM -III

CLASS :M.SC.S.Y

PAPER NAME & NO: **Nuclear and Particle Physic(303)**

TEACHER NAME :Ms.Ishrat Begham

SR.NO	TOPIC NAME	A.plne	Excution.Duration	
			From	To
1. UNIT	**Basic Nuclear Properties** Nuclear mass, Nuclear size : Nuclear Radius & its determination by Rutherford scattering, electron scattering & mirror nuclei method, Nuclear quantum numbers, Angular momentum, nuclear dipole moment, electric quadruple moment, Nuclear Binding , average binding energy and its variation with mass number, Semi empirical mass formula & its applications	15	1/7/2023	18/7/2023
2.UNIT	**Interac of nuclear radiation with matter and elementary particle** Interaction of charged particles & electromagnetic rays with matter, range, straggling, stopping power, interaction of alpha, beta, gamma rays with matter, absorption law of gamma rays, photoelectric effect, Compton effect, pair production, annihilation of electron- positron pair Nuclear Detectors: Classification, Ionization chamber: Principle, construction and working, Proportional counter: Principle, construction and working, Geiger Muller counter: Principle, construction and working (pulse formation, dead time, recovery time etc), quenching of discharge, Regions of multiplicative operations, Scintillation Detector: photo multiplier tube, organic and inorganic scintillators, scintillation process, theory, characteristic and detection efficiency Semiconductor Detector: properties, types (diffuse junction and surface barrier), Li drifted junction detector Elementary	15	20/7/2023	20/702023
3.UNIT	**Nuclear Forces and Nuclear Models** Nuclear Forces: Introduction , properties, characteristics, spin dependence of nuclear forces, charge independence & charge symmetry of nuclear forces, Elements of two body problem (Deuteron), its properties, Meson theory of nuclear forces, exchange force and tensor forces, its properties, neutron proton scattering at low energy, partial wave analysis, phase shift. Nuclear Models: Nuclear shell model: spin orbit coupling, nuclear magic numbers, experimental evidences of magic numbers, Angular momenta and parities of nuclear ground states, significance, achievements and limitations, magnetic moment and Schmidt lines.	15	10/8/2023	31/8/2023
4.UNIT	**Nuclear decay & Nuclear decay Reactions** Radioactive decay, laws of successive transformation, dosemetry, nuclear reactions: types, kinematics, transmutation, fission & fusion concept, energy production in stars, P-P and C-N cycles. β – decay, three forms of β- decay, Fermi and Gamow Teller transitions, Fermi theory of β- decay, Kurie plot, Angular momentum and parity, selection rules, allowed and forbidden transitions, non conservation of parity in β- decay, neutrino hypothesis: detection and properties.	15	1/9/2023	21/92023

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DEPT. OF PHYSICS

YEAR 2023-24

SEM -III

CLASS :M.SC.S.Y

PAPER NAME & NO: **Basics of Lasers and Devices**

TEACHER NAME :Mr.Anil B.H

SR.NO	TOPIC NAME	A.plne	Excution.Duration	
			From	To
1. UNIT	**Basics of Laser** Introduction, Interaction of Light and Matter, Quantum Behavior of Light, Energy Levels, Population, Thermal Equilibrium, Absorption and Emission of Light, Einstein's prediction and three processes, Light Amplification, High Intensity, Einstein's Relations, Conditions for Large Stimulated Emission, Conditions for Light Amplification, Population Inversion, Pumping, Pumping Methods: Optical; Electrical; Direct Pumping, Active Medium, Metastable States, Pumping schemes, Properties of Laser- Directionality, Intensity, Coherence, Monochromaticity, Polarization	15	1/7/2023	18/7/2023
2.UNIT	**Optical Resonator and Laser Cavity Modes** Optical Resonator: Introduction, Action of Optical Resonator, Threshold Condition, Critical Population Inversion, Condition for Steady State Oscillation, Cavity Resonance Frequencies, Line Broadening Mechanism, Natural or Intrinsic Broadening, Collision Broadening, Doppler Broadening, Laser Cavity Modes: Introduction, Cavity Configuration, Modes: Longitudinal and Transverse Modes, Single Mode Operation, Laser Rate Equation: Two Level System, Three Level System and Four Level System, Comparison of Three Level System and Four Level Lasers, Optimum Output Power, Properties of Laser Modes	15	20/7/2023	20/702023
3.UNIT	**Types of Laser** Solid State Laser:- General Description, Structure and Working: Ruby Laser, Nd: YAG Laser, Nd: Glass LaserGas Laser:- General Description, Structure and Working of : He-Ne Laser, Argon Laser, CO2 Laser Semiconductor lasers- Population inversion, pn junction, Lasing condition, Gain in a semiconductor, Optical cavity, Threshold condition for lasing, Threshold population inversion, and current density, Power output, Efficiency, Basic Laser structure, Diode laser operatio	15	10/8/2023	31/8/2023
4.UNIT	**Application of lasers** Introduction, optical fiber lasers (Low and High Power) for Industrial, Medical and Communication applications, High Power Gas Lasers Material Processing with Lasers – Surface treatments, Drilling with Lasers, Cutting Process with Lasers, Laser Welding Process Lasers in Nuclear Energy: Nuclear Fusion, Nuclear Fission, Laser in Isotopes Separation Lasers in Medicine and surgery: Biological Effect of Electromagnetic Radiation , Laser Diagnostics, Lasers in Electronics industry Lasers in Consumer Electronics industry	15	1/9/2023	21/92023

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ANNUAL TEACHING PLAN

YEAR 2023-24

SEM -I

CLASS :M.SC F.Y

PAPER NAME & NO:Mathematical Methods in Physics

TEACHER NAME : Mr.Pordwar S.S

SR.NO	TOPIC NAME	A.pln	Exc.Duration	
	Vector Spaces and Matrices		From	To
unit1	Linear dependence and independence of vectors, Inner product, Schmidt's orthogonalization method; Matrices – Inverse, Orthogonal, Hermitian and unitary matrices, Transformation of vectors and matrices; System of linear equations, eigenvalues and eigenvectors of square matrix, diagonalisation of a matrix, rotation matrix.	15	1/7/2023	18/7/2023
2.unit	Special functions Legendre equation, Rodrigues formula for Pn(x), generation functions and recurrence relation, Associated Legendre polynomial; Bessel equation, Bessel function of first kind, generating functions and	15	20/7/2023	20/702023
3.UNIT	Fourier Series and Integral Transform Fourier series: General properties of Fourier series, Simple applications, properties of Fourier series, convergence, integration, differentiation; 3.2 Fourier Transform, Laplace Transforms, Properties ofourier	15	10/8/2023	31/8/2023
4.UNIT	Complex function and Calculus of Complex function Definition of complex function, exponential function and properties, circular function and properties, hyperbolic function and properties, Inverse hyperbolic function, logarithmic function; limit of a complex	15	1/9/2023	21/92023

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ANNUAL TEACHING PLAN

YEAR 2023-24

Numerical Techniques and C-Programming

TEACHER NAME : Mr.Pordwar S.S

SR.NO	TOPIC NAME	A.pln	Exc.Duration	
			From	To
1. UNIT	**Curve fitting ,interpolation and Roots of equation** The Principle of Least squares, fitting a straight line, fitting a parabola, fitting an exponential curve, fitting curve of the form y=axb , fitting through a polynomial, Cubic spline fitting, Linear interpolation, difference schemes, Newton's forward and backward interpolation formula.Polynomial and transcendental equations, limits for the roots of polynomial equation. Bisectional method, false	15	1/7/2023	18/7/2023
2.unit	**Numerical integrations and Solution of differential equation** Newton cotes formula, trapezoidal rule, Simpson's one third rule, Simpson's three eight rule, Gauss quadratics method, Monte Carlo method. Taylor series method, Euler method, Runge Kutta method, predictor-corrector method.	15	20/7/2023	20/702023
3.UNIT	**Solution of simultaneous equation, Eigen values and eigenvectors of a matrix and Partial differential equation** Gaussian elimination method, pivotal condensation method, Gauss-Jordan elimination method, Gauss-Seidal iteration method, Gauss-Jordan matrix inversion method, Gaussian-elimination matrix inversion method. 3.2 Computation of real eigen values and corresponding	15	10/8/2023	31/8/2023
4.UNIT	C- Programming Elementary information about digital computer principles, compliers, interpreters, and operating systems, C programming, flow charts, integer and floating point arithmetic, expression, build in functions, executable and non-executable statements, assignment, control and input-output elements, user defined functions, operation with files: pointers 4.2	15	1/9/2023	21/92023

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YEAR 2023-24

SEM -III CLASS :M.SC.S.Y

PAPER NAME & NO: **Electrodynamic(301)**

TEACHER NAME :**Dr.Bhanudas S.N**

SR.NO	TOPIC NAME	A.plne	Excution.Duration	
			From	To
1. UNIT	**Maxwell equations and Electromagnetic waves** Maxwell's equations and their physical significance. Equation of continuity & relaxation time, Vector and scalar potentials, Lorentz and Coulomb gauge, gauge transformation, electromagnetic energy and Poynting's theorem, electromagnetic wave equations in free space, their plane wave solutions, waves in conducting medium: skin effect and skin depth, waves in ionized medium (ionospheric propagation), polarization of EM waves. Concept of radiation pressur	15	1/7/2023	18/7/2023
2.UNIT	**Electromagnetic waves in bounded media** Reflection and refraction of plane electromagnetic waves at a plane interface: normal incidence, oblique incidence, Fressnel's equations, Brewster's angle. Total internal reflection. Reflection and refraction from metallic surfaces, Electromagnetic wave propagation between two parallel conducting plates, waves in hollow conductors, Rectangular wave guides - TE and TM modes.	15	20/7/2023	8/8/2023
3.UNIT	**Radiations from moving charges** Concept of retarded potential, The Lienard-Wiechert potentials, Field produced by moving charges, radiation from a linearly accelerated charged particle at low velocity, radiation from accelerated charged particles at low velocities in circular orbits-Larmor formula, radiation from accelerated charged particles at relativistic velocities in circular orbits-relativistic generalization of Larmor formula Multipole expansion of EM field, Electric dipole radiation, field due to oscillating electric dipole, magnetic dipole radiations, electric quadrupole radiation, fields due to linear centre-fed half wave and full wave antenna, array of antenna	15	10/8/2023	31/8/2023
4.UNIT	**Covariance and Relativistic Electrodynamics** Basic kinematical results of special relativity (length contraction, time dilation, addition of velocities, charge invariance, field transformation), relativistic momentum and energy of a particle, 4-vectors in electrodynamics, 4-potential and 4-current, electromagnetic field tensor, Lorentz force and equation of motion of a charged particle in an electromagnetic field, Covariance of Maxwell's equations, transformation of EM fields and field tensor. Electromagnetic wave equation and plane wave solution in 4-vector form.	15	1/9/2023	30/9/2023

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