

Government General Degree College Chapra
Curriculum Plan under NEP 2020
Department of Mathematics
B.Sc Mathematics (Major Course)
Semester- VI

Semester	Period of Semester	Course Code	Name of the Faculty	Paper Name	Brief Description of the Topic	Number of Lecture
SEM- VI	January- June	MATH- M-T-08	Dr. Asim Kumar Das	Mechanics-1	<p>Motion in a straight line, motion under attractive and repulsive forces, motion under acceleration due to gravity.</p> <p>Simple harmonic motion, horizontal oscillation, composition of two S.H.M. 's, damped harmonic motion, forced oscillation, damped forced oscillation.</p> <p>Motion in a resisting medium: Vertical and curvilinear motion in a resisting medium.</p> <p>Motion of varying mass: Equations of motion.</p> <p>Work, Power and Energy: Definitions. Work done in stretching an elastic string.</p> <p>Conservative forces. Conservation of energy.</p> <p>Impulse and impulsive forces: Impulse of a force. Impulsive forces. Conservation of linear momentum.</p> <p>Collision of elastic bodies: Elasticity. Impact of smooth bodies. Impact on a fixed plane. Direct and oblique impact of two</p>	30 L

					smooth spheres. Loss of kinetic energy. Angle of deflection	
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			Biswajit Paul	Mechanics-1	<p>Motion in a Plane: Velocity and acceleration of a particle moving on a plane in Cartesian and polar coordinates. Motion of a particle moving on a plane refers to a set of rotating rectangular axes. Angular velocity and acceleration. Circular motion. Tangential and normal accelerations.</p> <p>Central orbit: Characteristics of central orbits. Areal velocity. Law of force for elliptic, parabolic and hyperbolic orbits. Velocity under central forces. Orbit under radial and transverse accelerations. Stability of nearly circular orbits.</p> <p>Planetary motion: Newtonian law. Orbit under inverse square law. Kepler's laws of planetary motion. Time of description of an arc of an elliptic, parabolic and hyperbolic orbit. Effect of disturbing forces on the orbit. Artificial satellites: Orbit round the earth. Parking orbits. Escape velocity.</p>	20 L
			Dr. Aninda Chakraborty	Mechanics-1	<p>Degrees of freedom. Moments and products of inertia: Moment of inertia (M.I) and product of inertia (P.I.) of some simple cases. M.I. about a</p>	25 L

					<p>perpendicular axis. Routh's rule. M.I. about parallel axes. M.I about any straight line. M.I of a lamina about a straight line in its plane. Momental Ellipsoid. Equi-momental systems. General equations of motion: D'Alembert's principle and its application to deduce general equations of motion of a rigid body. Motion of the centre of inertia (C.I.) of a rigid body. Motion relative to C.I.</p> <p>Motion about an axis: Rotation of a rigid body about a fixed body. Equation of motion. K.E. of the body rotating about an axis. Compound pendulum and its minimum time of oscillation.</p> <p>Motion in two dimensions under finite forces: Equations of motion. K.E. and angular momentum about the origin of a rigid body moving in two dimensions. Two – dimensional of a solid of revolution down a rough inclined plane. Necessary and sufficient conditions for pure rolling.</p>	
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		MATH-M-T-09	Dr. Asim Kumar Das	Linear Programming Problems & Game Theory.	<p>Introduction to linear programming problems. Mathematical formulation of LPP. Graphical solution.</p> <p>Convex sets. Basic solutions (B.S.) and non-basic solutions. Reduction of B.F.S from B.S.</p> <p>Theory of simplex method. Optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables. Big-M method. Two-phase method.</p> <p>Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of dual.</p>	30L
			Dr. Aninda Chakrabarty	Linear Programming Problems & Game Theory	<p>Transportation problem and its mathematical formulation, northwest-corner, row-minima, column minima, matrix-minima, and Vogel approximation methods for determination of initial basic solution. Algorithms for solving transportation problems.</p> <p>Assignment problem and its mathematical</p>	25 L

					<p>formulation, Hungarian method for solving assignment problems.</p> <p>Travelling Salesman Problems.</p>	
			Biswajit Paul	Linear Programming Problems & Game Theory	<p>Game theory: Formulation of two-person zero sum games.</p> <p>Solving two-person zero sum games. Games with mixed strategies. Graphical solution procedure.</p> <ul style="list-style-type: none"> • Solving game using simplex algorithm. 	20 L
SEM-VI		MATH-M-T-10	Dr. Asim Kumar Das	Multivariate Calculus, Vector & Tensor Analysis.	<p>Functions of several variables, limit and continuity of functions of two or more variables.</p> <p>Differentiability and total differentiability. Partial differentiation</p> <p>Sufficient condition for differentiability. Schwarz's theorem, Young's theorem.</p> <p>Chain rule for one and two independent parameters.</p> <p>Homogeneous function and Euler's theorem on homogeneous</p>	30L

					<p>functions and its converse.</p> <p>Jacobians and functional dependence.</p> <p>Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems. Double integration over a rectangular region. Double integration over non-rectangular regions. Double integrals in polar coordinates,</p> <p>Triple integrals. Triple integral over parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical coordinates.</p> <p>Change of variables in double integrals and triple integrals.</p>	
SEM-VI		MATH-M-T-10	Dr. Aninda Chakrabarty.	Multivariate Calculus, Vector & Tensor Analysis.	<p>Introduction to vector functions, operations with vector-valued function</p> <p>Limits and continuity of vector functions,</p> <p>Directional derivatives. Gradient, divergence, curl of vector functions</p> <p>Differentiation and integration of vector functions of one variable.</p> <p>Line integrals, applications of line integrals: Mass and work. Fundamental theorem for line integrals, conservative vector fields, independence of path.</p>	20L

					Green's theorem, surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The divergence theorem. Applications of Green's, Stoke's and divergence theorems.	
SEM-VI		MATH-M-T-10	Biswajit Paul.	Multivariate Calculus, Vector & Tensor Analysis.	<p>A tensor as a generalized concept of a vector in E^3 and its generalization in E_n. Space of n-dimension. Transformation of coordinates. Summation convention.</p> <p>Definition of scalar or invariant. Contravariant, covariant vectors and tensors, mixed tensors of arbitrary order. Kronecker delta</p> <p>Equality of tensors, addition, subtraction of two tensors.</p> <p>Outer product of tensors, contraction and inner product of tensors.</p> <p>Symmetric and skew symmetric tensors.</p> <p>Quotient law, reciprocal tensor of a tensor.</p> <p>Metric tensor, Christoffel symbol, covariant derivative.</p>	25 L