Department of Mathematics

Teaching Plan

Session -**2021-22**

Name of the faculty: **Dr. Tarun Maiti**

Sem I: Core Course: Vector Analysis

Month	Topics to be covered			
	1st week	**2nd week**	**3rd week**	**4th week**
July	Basics of Vector algebra	Vector Triple product	Vector Triple product	Solving Problems on Vector Triple product
August	Vector equations	Vector equations	Practice Problems on Vector equations	Solution of Vector equations
September	Applications to geometry and mechanics — concurrent forces in a plane	Theory of couples	System of parallel force	Introduction to vector functions
October	Class test, Limits and continuity of vector functions	Puja Vacation	Puja Vacation	Puja Vacation
November	Puja Vacation	Limits and continuity of vector functions	Differentiation and integration of vector functions of one variable.	Internal Test
December	Tutorial	University Exam	University Exam	University Exam

Sem II: no Core Course

Sem III: SEC-A: C Programming Language

Month	Topics to be covered			
	1st week	**2nd week**	**3rd week**	**4th week**
July	An overview of theoretical	compiler, assembler,	Character set.	expression, assignment

	computers, history of computers, overview of architecture of computer,	machine language, high level language, object-oriented language, programming language and importance of C programming.	Constants and variables data types,	statements, declaration. Home Assignments
August	Operation and Expressions: Arithmetic operators, relational operators, logical operators.	Decision Making and Branching: decision making with if statement, if-else statement, Nesting if statement,	switch statement, break and continue statement.	Control Statements: While statement, do-while statement,
September	for statement. Home Assignments. Discussion some basics programs	Arrays: One-dimension two-dimension and multidimensional arrays, declaration of arrays, initialization of one and multi-dimensional arrays.	Class Test, Hands on C programming on computer	User-defined Functions: Definition of functions, Scope of variables, return values and their types,
October	function declaration, function call by value	Puja Vacation	Puja Vacation	Puja Vacation
November	Puja Vacation	Nesting of functions, passing of arrays to functions. Doubt clearing	Recurrence of function. Introduction to Library functions: stdio.h, math.h, string.h stdlib.h, time.h etc.	Internal Test
December	Tutorial	University Exam	University Exam	University Exam

Sem IV: Core Course 10: Mechanics

Month	Topics to be covered			
	1st week	2nd week	3rd week	4th week
July	Work, power, kinetic energy, conservative forces - potential energy.	Existence of potential energy function. Energy conservation in a conservative field. Stable equilibrium and small oscillations:	Approximate equation of motion for small oscillation. Impulsive forces. Problems' assignment.	Linear momentum, linear momentum principle, motion of the centre of mass, conservation of linear momentum
August	Moment of a force about a point, about an axis. Angular momentum about a point, about an axis.	Angular momentum principle about centre of mass. Conservation of angular momentum (about a point and an axis).	Configurations and degrees of freedom of a multi-particle system, energy principle, energy conservation	Rocket motion in free space and under gravity. Problem Assignment
September	collision of elastic bodies. The two-body problem.	collision of elastic bodies. The two-body problem.	Motion of a projectile in a resisting medium under gravity, orbits in a central force field, Stability of nearly circular orbits.	Motion under the attractive inverse square law, Kepler's laws on planetary motion
October	Class Test and Doubt clearing.	Puja Vacation	Puja Vacation	Puja Vacation
November	Puja Vacation	Slightly disturbed orbits, motion of artificial satellites. Constrained motion of a particle on smooth and rough curves.	Equations of motion referred to a set of rotating axes.	Motion on a smooth sphere, cone, and on any surface of revolution.
December	Tutorial, Internal Test	University Exam	University Exam	University Exam

Sem V: DSE-B(1): Linear Programming & Game Theory

Month	Topics to be covered			
	1st week	2nd week	3rd week	4th week
July	Transportation and Assignment problems.	Transportation and Assignment problems.	Transportation and Assignment problems.	Mathematical justification for optimality criterion. Hungarian method.
August	Traveling Salesman problem. Assignments on some Basic Problems.	Concept of game problem. Rectangular games.	Pure strategy and Mixed strategy. Saddle point and its existence. Optimal strategy and value of the game.	Necessary and sufficient condition for a given strategy to be optimal in a game.
September	Concept of Dominance.	Fundamental Theorem of rectangular games.	Algebraic method, Graphical method	Dominance method of solving Rectangular games.
October	Class test and Doubt clearing	Puja Vacation	Puja Vacation	Puja Vacation
November	Puja Vacation	Other method to solve game problem	Inter-relation between theory of games and L.P.P.	Internal Test
December	Tutorial	University Exam	University Exam	University Exam

Sem VI: DSE-A(2): Mathematical Modelling

Month	Topics to be covered			
	1st week	2nd week	3rd week	4th week
July	Basics of Monte Carlo	Basics of Monte Carlo	Simulating deterministic behavior (area	generating random numbers:

	simulation modelling	simulation modelling	under a curve, volume under a surface),	middle square method, linear congruence,
August	generating random numbers: middle square method, linear congruence. Assignments on some basic problems	Basics of queuing models	Basics of queuing models	Solving problems on Basics of queuing models.
September	harbor system model	harbor system model	morning rush hour model	morning rush hour model Class Test
October	Linear programming model: geometric solution algebraic solution	Puja Vacation	Puja Vacation	Puja Vacation
November	Puja Vacation	simplex method	sensitivity analysis	Internal Test
December	Tutorial	University Exam	University Exam	University Exam

Sem VI: Core Course 14 Practical: Numerical Methods Lab

Month	Topics to be covered			
	1st week	2nd week	3rd week	4th week
July	Program 1: Calculate the sum of series Program 2; sorting numbers	Solution of transcendental and algebraic equations by i) Bisection method ii) Newton Raphson method	3. Solution of transcendental and algebraic equations by iii) Secant method. iv) Regula Falsi method	Numerical Integration i) Trapezoidal Rule ii) Simpson's one third rule
August	Numerical Integration iii) Weddle's Rule iv)	Numerical Integration iv) Gauss Quadrature	Solution of ordinary differential equations i) Euler method	Solution of ordinary differential equations iii) Runge Kutta

	Gauss Quadrature		ii) Modified Euler method	method (order 4) iv) The method of successive approximation s (Picard
Septembe r	Interpolatio n i) Lagrange Interpolatio n	Interpolation ii) Newton's forward, backward and divided difference interpolations	Interpolation ii) Newton's forward, backward and divided difference interpolations	Solution of system of linear equations i) LU decomposition method ii) Gaussian elimination method
October	Solution of system of linear equations iii) Gauss-Jaco bi method iv) Gauss-Seide l method	Puja Vacation	Puja Vacation	Puja Vacation
November	Puja Vacation	Method of finding Eigenvalue by Power method (up to 4 × 4)	Fitting a Polynomial Function (up to third degree)	Fitting a Polynomial Function (up to third degree)
December	Practice	University Exam	University Exam	University Exam