



MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY

(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)

Bathinda-151001 (Punjab), India

Department: **DEPARTMENT OF MATHEMATICS**
MRSPTU MAIN CAMPUS ,BATHINDA

Program: **B.SC (HONS) (2018)**

Subject	S Code	Semester	Credit	Duration (Hrs)	L T P	Cos	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
Calculus-I	BMAT1-101	1	5	5	5	4 1 0	CO1	Apply the knowledge of basic concepts of calculus in order to study theoretical development of different mathematical techniques and their applications.	2	1	3	2	1	2				2	1	1	2	2	
							CO2	Develop the skills to sketch the curves in a plane using its mathematical properties in the different coordinate systems of reference.	1	3	2												

						CO3	Apply derivatives for the computation of directional derivative and Optimization.	2	1		1	1	1	2			1	1	1	2	2		
						CO4	Extend the knowledge of Partial derivatives of higher order for further exploration of the subject for going into higher education	2	1		1			2							2	2	
Algebra-I	BMAT1-102	1	5	5	5	410	CO1	Understand the basic concepts of linear transformations, the Rank-Nullity Theorem, matrix of a linear transformation, algebra of transformations and the change of basis.	3			2						1			1	1	2
						CO2	Analyze& solve problems related to Matrices, Quotient space, Homomorphism & Isomorphism of vector space and Null space etc.	1			2	2							1			2	1
						CO3	Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using rank.	1			2	2							1			1	2
						CO4	Find eigenvalues and corresponding eigenvectors for a square matrix	1			2	2			2							1	2
Analysis-I	BMAT1-103	1	5	5	5	410	CO1	Understand many properties of the real line \mathbb{R} , including completeness and Archimedean properties				3			2				3			3	3

Fortran Programming	BCAPI-101	1	4	4	5	400	CO2	Apply the ratio, root, and alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.										1	1		3			3		3		2							
							CO3	Understand the concept of continuous functions, uniform continuity and discontinuity																1			2			2		3	3		
							CO4	Apply mean value theorem, Taylor's theorem																	3	1					1		3	3	
							CO1	Operating Systems, Linux, Windows and other Operating Systems, Open Source Foundation and GNU																	1	1	1			1	2	1	1	1	2
Fortran Programming Lab	BCAPI-102	1	1	30	002	CO1	CO2	Programming and Problem Solving, Basic FORTRAN, Control Constructs.	1	2	1								2		1	2	2	2	2	2	2	1	2	3					
							CO3	Skills for writing computational programs.	1	2	1	1												2		1	3	3	3	3	1	2	3		
							CO4	Different numerical techniques utilized in programming.		1	1	1	1	2											1	2	3	3	3	3	3	1	2	3	
							CO1	Use operating Systems, Linux, Windows and other Operating Systems, Open-Source Foundation and GNU	1	1	1	1	1	1	2										2	2	3	3	3	3	2	1	2	3	

						CO2	Use Programming and Problem Solving, Basic FORTRAN, Control Constructs.	1	2	1	1	2	2	2	3	3	3	3	2	1	2	3					
						CO3	Design and code mid-level problems.	1	2	1	1	2	3	2	3	3	3	3	2	1	2	3					
						CO4	Understand basic programming concepts Isomorphism of vector space and Null space etc.	2	2	1	1	2	3	2	3	3	3	3	2	1	2	3					
English	BHUM1-101	1	4	55	400	CO1	To know about the various dimensions of communication skills and to understand its importance	1	1	1	1	1	1	2	2	3	3	3	2		2						
						CO2	To comprehend the role of communication at different levels (verbal, non-verbal, official, and non-official).	1	2	1	1	2	2	2	3	3	3	3	2			2	2				
						CO3	To know about the intricacies of written communication for office use.	1	2	1	1	1	3	2	3	3	3	3	2								3
						CO4	To make pupil prepare for presenting him/herself in interviews, GD etc.	1	2	1	1	1	3	2	3	3	3	3	2			2	2	2			
Calculus-II	BMAT1-204	2	5	55	410	CO1	Apply the knowledge of advanced concepts of calculus in order to study theoretical development of different mathematical techniques and their applications.	2	1		3	2	1	2			2	1	1		2	2					

						CO2	Use the idea of reduction formulae enables to solve an integral problem by reducing it to a problem of solving an easier integral problem	1			1		1	1				2	1					
						CO3	Develop the knowledge of computing arc length, area and volume by using integration.	1	2		1	2	1	1				1	1	2				
						CO4	Extend the knowledge of multiple integrals, scalar surface integrals, vector surface integrals and theorems of Green, Gauss and Stokes for exploring its use in physical sciences	1	2		1		2					1	2	2				
Algebra-II	BMAT1-205	2	5	55	4 1 0	CO1	Understand the concept of group, Ring and their properties.	1			2			1				2	2	3				
						CO2	Analyze& demonstrate different types of algebraic structures such as subgroups Normal subgroups and Quotient groups to understand and use the fundamental results in Algebra.	1			2	2		2				2	2		2	1		
						CO3	Apply the concepts of isomorphism and homomorphism for groups and rings to solve different types of problems.	1			2		2	2					1			2	3	
						CO4	Access the idea of inner product space and determine its orthogonally on vector space, including gram – Schmidt orthogonalization to obtain orthonormal basis	1			2			2					2				1	

Analysis-II	BMAT1-206	2	5	55	4 1 0	CO1	Compare countable and uncountable sets	2		1	2						3		3	2			
						CO2	Apply various tests uniform convergence			1	2	2						1		3	2		
						CO3	Understand the interchange of limit ,derivative, integrals				3		1						1		3	2	1
						CO4	Understand the concept of metric spaces			1	3								2		3	2	
Fundamentals of Computer and C Programming	BCAP1-203	2	4	45	4 0 0	CO1	Implement programs using C.	1	2	3									2	1	3		
						CO2	Implement fundamental data structures in C.	3	1						2				2	1	3		
						CO3	Understand the fundamentals of hardware, software, and programming.										3		2	1	3		
						CO4	Understand the logic building used in Programming.					2		1						2	1	3	
Fundamentals of Computer and C Programming Lab	BCAP1-204	2	1	30	0 0 2	CO1	Implement programs using C	1	1	2	1	1	2	2	2	3	3	3	2	1	2	3	
						CO2	Implement fundamental data structures in C. Isomorphism of vector space and Null space etc.	1	2	1	1	2	2	2	3	3	3	3	2		1	2	3
						CO3	Write the programming solutions for solving various real-life problems. augmented matrix, using rank.	1	2	1	1	1	3	2	3	3	3	3	2		1	2	3

						CO4	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.	1	2	1	1	1	3	2	3	3	3	3	2	1	2	3	
Environmental Science	BHUM1-202	2	4	45	400	CO1	Understand the value of non-renewable Resources such as petroleum and natural gas.	1	1	2	1	1	2	2	2	3	3	3	2		3		
						CO2	Learn that how the bodies of living organisms decomposes after death.	1	2	1	1	2	2	2	2	3	3	3	3	2		2	
						CO3	Find out the causes of distinct sorts of pollution and their solutions	1	2	1	1	1	3	2	3	3	3	3	3	2		3	
						CO4	Grasp knowledge that how the rain water can be stored and used while climate changes like draught.	1	2	1	1	1	3	2	3	3	3	3	3	2		2	
Differential equations-I	BMAT1-307	3	5	55	410	CO1	Understand the concept of ordinary differential equation, formation and order and degree of differential equation etc.	2			2	1	2	2	3					2	3	1	
						CO2	Apply various methods to Solve first order non-linear differential equation and linear differential equations of higher order	1			3	1	2	2	3				2		3	2	
						CO3	Apply various power series methods to find series solution of differential equations.	2			3	1	2	1	1				1		1	2	
						CO4	Apply differential equations to significant applied and theoretical problems.	2			3	1	2	2	2				1		1	2	

Mathematical statistics	BMAT1-308	3	5	55	4 1 0	CO1	Understand and use the concept of probability theory and statistics to solve industrial problems	2	1		2	3		1			2	1	1	2								
						CO2	Examine the two dimensional random variable , expectation , moments and its properties.	1	3		2	1	1	1										2		2		
						CO3	Study the various discrete and continous distributions .	2	1		1	1	1	2					1	1	1	2					1	
						CO4	Understand the concept of Chi square, t ,F distributions and testing of hypothesis .	2	1	3	1	1		2						1			1				1	
Geometry	BMAT1-309	3	5	55	4 1 0	CO1	Understand the relationship between different coordinate systems, transformation of axes and intersection of three planes.	1	3		1		1							1	1							
						CO2	Apply the knowledge to obtain the equation of cone, enveloping cone, tangent plane, reciprocal cone of given cone and prove their results.	1	2		1		1											1	1			
						CO3	Develop the equation of cylinder, right circular cylinder, enveloping cylinder.	1	2		1		1												1	1		
						CO4	Introduce the family of spheres passing through a circle, tangent planes and normal lines to a sphere and radical planes.	1	2		1		1												2	1		
Number Theory	BMAT1-310	3	5	55	4 1 0	CO1	Find quotients and remainders from integer division, Division algorithm, Apply Euclid's algorithm for the greatest common divisor, Linear Diophantine equations, Prime numbers	1	3		1		1	2						1								

						CO2	Learn about congruence, residue classes and least residues add and subtract integers, modulo n, multiply integers and calculate powers, modulo n, Simultaneous linear congruence's	1	2		1		1	2						1			
						CO3	Familiarize with Arithmetic modulo p and related theorems, Solving congruences modulo prime powers.	1	2		1		1	2							1		
						CO4	Learn about Euler's Phi function, Euler's theorem and properties of the Phi Function	1	2		1		1	3							1		
Object Oriented Programming	BCAP1-305	3	3	45	300	CO1	Implement programs using C++.	1	1	1	1	1	2	2	2	3	3	3	2	1	2	3	
						CO2	Implement fundamental data structures in C++.	1	2	1	1	2	2	2	3	3	3	3	2	1	2	3	
						CO3	Learn various concepts of object-oriented approach towards problem solving.	1	2	1	1	1	3	2	3	3	3	3	2	1	2	3	
						CO4	Create computer-based solutions to various real-world problems using Object oriented programming.	1	2	1	1	1	3	2	3	3	3	3	2	1	2	3	

Object Oriented Programming lab	BCAP1-306	3	1	30	0 0 2	CO1	Implement programs using C++.	1	1	1	1	1	2	2	2	3	3	3	2	1	2	3		
						CO2	Implement fundamental data structures in C++.	1	2	1	1	2	2	2	3	3	3	3	2	1	2	3		
						CO3	Learn programming from real world examples.	1	2	1	1	1	3	2	3	3	3	3	2	1	2	3		
						CO4	Create simple programs using classes and objects	1	2	1	1	1	3	2	3	3	3	3	2	1	2	3		
Differential equations-II	BMAT1-410	4	5	55	4 1 0	CO1	Understand the concept of partial differential equation of first order (linear and nonlinear).	2			2	1	2	2	3			1		2	2			
						CO2	Solve partial differential equations (linear and nonlinear) using various methods and apply these methods in solving some physical problems.	1			3	1	2	2	3			2		1	2			
						CO3	Understand the formation and solution of some significant PDEs like wave equation, heat equation and diffusion equation	2			3	1	2	1	1			1		2	1			
						CO4	Undertake any advanced course on ordinary as well as partial differential equations	2			3	1	2	2	2			1		2	1			
Linear Algebra	BMAT1-411	4	5	55	4 1 0	CO1	Apply the knowledge of Algebra which enables to build mathematical thinking and skill.	1	2									1		2				
						CO2	Analyze& solve problems related to Rank and Nullity of linear transformation etc.	2		1	3											2		
						CO3	Find eigenvalues and corresponding eigenvectors for a square matrix.	2			1			2	1								1	

						CO4	Identify the problems in mathematics and find their suitable solution.	1		1	2			3				2				
Mechanics-I	BMATI-412	4	5	55	4 1 0	CO1	Use Lagrange's equation for deriving equation of motions			2	2	3					2		1	3		
						CO2	Apply the knowledge in Dynamics at higher levels.			1	2	3	3	2			2		3			
						CO3	Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long before the mathematical theory given by Newton.			2	1	2	3							2	3	
						CO4	Study mechanical systems under generalized coordinate systems, Virtual work, Energy and momentum, to study mechanics developed by Lagrange, Hamilton, Jacobi and small oscillation				3		2	3	3		3	2		2	3	
Numerical Methods	BMATI-413	4	5	55	4 1 0	CO1	Learn various types of numerical methods to find the roots of nonlinear equations and solution of a system of linear equations.	3	3		2	3	1	2	2			2		2	1	2
						CO2	Find values for a tabulated function using Interpolation techniques.	1	2		3	2	1	2				2		1	2	1
						CO3	Apply these numerical methods to solve ordinary differential equation.	2			3	2	1	1	2			1		3	1	2
						CO4	Introduce the basic concepts of Numerical Mathematics to solve the problems arising in science and engineering etc.	1	1		3	3	1	2	1			2		1	3	2

Latex and R	BCAPI-407	4	3	45	300	CO1	Use Latex, Basic tools for Formatting text.		2	2					1			2	2	2	
						CO2	Producing Mathematical Formulae using Latex.			1		3	2			2			2	1	2
						CO3	Able to formulate arrays and matrices		2		1		2			2			2	2	3
						CO4	Consequently students can write research papers and prepare presentations.				3		2			2			2	1	2
Latex and R lab	BCAPI-408	4	1	30	002	CO1	Use Latex, Basic tools for Formatting text		2	2					1			2		3	
						CO2	Producing Mathematical Formulae using Latex			1		3	2			2			1	2	3
						CO3	Arrays and Matrices	2			1		2			2			1		3
						CO4	Consequently students can write research papers and prepare presentations.				3		2		3			2		2	2
Mechanics-II	BMATI-514	5	5	55	410	CO1	Thorough understanding of dynamics is essential to understanding any modern development of Physical sciences.			2	2	3				2			1	3	
						CO2	Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long before the mathematical theory given by			1	2	2	3	2		2			2	3	

						Newton.																
						CO3	Mechanics and its applications are an excellent example of how physics and mathematics work hand in hand to give a complete picture of the real problems.			2	1	2	3						3	1		
						CO4	Reduction of two-body central force problem to an equivalent one-body problem, Central force motion in a plane.				3		2	3	3		3	2		2	2	
Mathematical Methods	BMAT1-515	5	5	55	4 10	CO1	Fourier series and its applications.			2	2	3				2			3	3		
						CO2	Fourier transform and its applications to P.D.E			1	2	2	3	2		2			3	2		
						CO3	Laplace transform and its applications to solutions of integrals and Differential Equations.			2	1	2	3							2	2	
						CO4	Z-transforms and inverse Z-transforms and its importance in context of Difference equations.				3		2	3	3		3	2		2	1	
Differential Geometry	BMAT1-516	5	5	55	4 10	CO1	Students will be at ease to understand the various curves in space		2		3		1						2			
						CO2	Students will be able to understand the behavior of the curves in various situations.				2	2					2				1	
						CO3	Students will be able to understand the Concept of surface				2		2				2			2		
						CO4	Students will be able to understand geodesics				1						2			1		

Finite Element Methods	BMATI-517	5	5	55	4 1 0	CO1	Demonstrate the steps of finite element methods in finding solution of Dynamic, Heat transfer, Solid Mechanic and Eigen value problems			2	2	3						2	3			
						CO2	Analyze the real time situations and convert it into Finite Methods to find solutions			1	2			2					2			
						CO3	Solve the Ordinary differential equations with Finite Element Method	2			1		2							3		
						CO4	Solve Elliptic, Hyperbolic and Parabolic P.D.E by Finite Element Method				3		2		3		2			3	1	
MATLAB	BCAPI-509	5	3	45	3 0 0	CO1	Use MatLab for Basic mathematics computations	1	2	1	1	1	2	2	2	3	3	3	2	1		3
						CO2	Creating M-files,working with script tools and also writing script file	1	2	1	1	2	2	2	3	3	3	3	2	2	1	2
						CO3	Program scripts and functions using the MatLab development environment, Able to use basic flow controls (if else, for, while).	1	2	1	1	1	3	2	3	3	3	3	2	2		2
						CO4	Use matlab for calculus, numerical integration and other mathematical operations.	1	2	1	1	1	3	2	3	3	3	3	2	1		3
MATLAB Lab	BCAPI-510	5	1	15	0 0 2	CO1	Understand the main features of the MatLab development environment	1	2	1	1	1	2	2	2	3	3	3	2	2	2	3
						CO2	Design simple algorithms to solve problems	1	2	1	1	2	2	2	3	3	3	3	2	2	2	3
						CO3	Write simple programs in MaTLab to solve scientific and mathematical problems	1	2	2	1	1	3	2	3	3	3	3	2	1	1	3
						CO4	Understand the main features of the MATLAB/SCILAB program development environment.	1	2	1	1	1	3	2	3	3	3	3	2	2	1	2

LPP	BMATI-618	6	5	55	4 1 0	CO1	Introduce and formulate linear programming models of real life situations.	1	2								1	1	1			
		CO2	Understand the selection and implementation of graphical solution and variants of simplex method for the solution of LPP.			1		1	2	1	1			1	1	2	2	2				
		CO3	Develop the relationships between the primal and dual problems and their solutions.					1	2					1	2	1						
		CO4	Apply the knowledge to solve two-person zero-sum game problems	1		1		2	1	1				2	2	1	1					
Ring Theory	BMATI-619	6	5	55	4 1 0	CO1	Know the fundamental concepts in ring theory such as the concepts of ideals, quotient rings, integral domains, and fields.		1		3		2						3	1	2	
		CO2	Ring theory is powerful in terms of its scope and generality, but it can be simply described as the study of systems in which addition and multiplication are possible.					2	2					2			2			2	1	2
		CO3	Find radicals, bases etc. for special classes of finite dimensional algebras. The student is able to describe the corresponding module if a representation is given, and vice versa.					2		2				3						2	1	2
		CO4	Apply various concepts in real life problems					1						2					2	1	2	

Mathematical Modelling	BMATI -620	6	5	55	4 1 0	CO1	Demo Understand the concept of several modelling techniques and analyze the resulting systems	1	1			3	1	2	3				3	1				
		CO2	Analyze and construct mathematical models inspired by real life problems.	1		2		2	3	1	2	3								3	1	1		
		CO3	The use of mathematics software to observe the implementations of the above mentioned methods efficiently, and to enhance the problem solving skills.	2		3		2	2	2	1	2	3		2						3	2	1	
		CO4	Solve physical problems using differential equations. nstrate the steps of finite element methods in finding solution of Dynamic, Heat transfer , Solid Mechanic and Eigen value problems	1		2		1	2	1											3	2		
Discrete Mathematics	BMATI -621	6	5	55	4 1 0	CO1	Significant concepts of partial order relations, Recurrence relations, Boolean algebra, Lattices and Graph Theory.		1		2		3							3	2	2		
		CO2	To understand logical concepts and to show logical equivalences by using truth tables and rules in logics.					3	2				2		2						2	1	2	
		CO3	Appreciate the definition and basics of graphs along with types and their examples.					2		2					3							2	1	2
		CO4	Understand the definition of a tree and learn its applications to fundamental circuits. Know the applications of graph theory to network flows. Relate the graph theory to the real-world problems.	1				1		2						2						2	1	2

Financial mathematics	BMATI-622	6	5	55	410	CO1	Quantitative analysis of financial transactions, understanding of different types of interest rates.	1		2	1		2		1		2		3	1	
		CO2	Accumulated sum of annual annuity and of P-due annuity.			1	1		2		2			2			2	1			
		CO3	Understand the concepts related to financial transactions yield.				2	2					1			2	1				
		CO4	Analyze real investments with different yields.						2	3		2			2		2	1			



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Bathinda-151001 (Punjab), India

Department: **DEPARTMENT OF MATHEMATICS**
MRSPTU MAIN CAMPUS ,BATHINDA

Program: **B.SC (HONS.) (2019)**

Subject	S Code	Semester	Credit	Duration (Hrs)	L T P	Cos	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
Calculus-I	BMATS1-101	1	4	060	310	CO1	Apply the knowledge of basic concepts of calculus in order to study theoretical development of different mathematical techniques and their applications.	2	1		3	2	1	2				2	1	1	2	2	
						CO2	Develop the skills to sketch the curves in a plane using its mathematical properties in the different coordinate systems of reference.	1	3		2												

						CO4	Different numerical techniques utilized in programming.		1	1	1	1	2		1	2	3	3	3	1	2	3
Fortran Programming lab	BMATS1-105	1	1	30	0 0 2	CO1	Use operating Systems, Linux, Windows and other Operating Systems, Open-Source Foundation and GNU	1	1	1	1	1	1	2	2	3	3	3	2	1	2	3
						CO2	Use Programming and Problem Solving, Basic FORTRAN, Control Constructs.	1	2	1	1	2	2	2	3	3	3	3	2	1	2	3
						CO3	Design and code mid-level problems.	1	2	1	1	2	3	2	3	3	3	3	2	1	2	3
						CO4	Understand basic programming concepts Isomorphism of vector space and Null space etc.	2	2	1	1	2	3	2	3	3	3	3	2	1	2	3
English	BHSMC0-001	1	4	60	3 1 0	CO1	To know about the various dimensions of communication skills and to understand its importance	1	1	1	1	1	1	2	2	3	3	3	2	2		
						CO2	To comprehend the role of communication at different levels (verbal, non-verbal, official, and non-official).	1	2	1	1	2	2	2	3	3	3	3	2	2	2	
						CO3	To know about the intricacies of written communication for office use.	1	2	1	1	1	3	2	3	3	3	3	2			

						CO4	To make pupil prepare for presenting him/herself in interviews, GD etc.	1	2	1	1	1	3	2	3	3	3	3	2	2	2	2							
Calculus-II	BMATS1-201	2	4	60	3	10	CO1	Apply the knowledge of advanced concepts of calculus in order to study theoretical development of different mathematical techniques and their applications.	2	1		3	2	1	2			2	1	1		2	2						
							CO2	Use the idea of reduction formulae enables to solve an integral problem by reducing it to a problem of solving an easier integral problem	1			1		1	1					2			2	1					
							CO3	Develop the knowledge of computing arc length, area and volume by using integration.	1	2		1	2	1	1						1			1	2				
							CO4	Extend the knowledge of multiple integrals, scalar surface integrals, vector surface integrals and theorems of Green, Gauss and Stokes for exploring its use in physical sciences	1	2		1		2							1				2	2			
							CO4	To make pupil prepare for presenting him/herself in interviews, GD etc.	1	2		1	1	1	3	2	3	3	3	3	3	2	2	2	2	2	2	2	
Algebra-II	BMATS1-202	2	4	60	3	10	CO1	Understand the concept of group, Ring and their properties.	1			2			1				2		2	3							
							CO2	Analyze& demonstrate different types of algebraic structures such as subgroups Normal subgroups and Quotient groups to understand and use the fundamental results in Algebra.	1			2	2		2					2				2	1				

						CO3	Apply the concepts of isomorphism and homomorphism for groups and rings to solve different types of problems.	1			2			2	2				1		2	3				
						CO4	Access the idea of inner product space and determine its orthogonally on vector space, including gram – Schmidt orthogonalization to obtain orthonormal basis	1			2				2				2			1				
Analysis-II	BMATS1-203	2	4	60	3 1 0	CO1	Compare countable and uncountable sets	2		1	2								3		3	2				
						CO2	Apply various tests uniform convergence			1	2	2						1				3	2			
						CO3	Understand the interchange of limit ,derivative, integrals				3		1						1				3	2	1	
						CO4	Understand the concept of metric spaces			1	3								2				3	2		
Fundamentals of Computer and C Programming	BMATS1-204	2	4	60	3 1 0	CO1	Implement programs using C.	1	2	3											2	1	3			
						CO2	Implement fundamental data structures in C.	3	1								2					2	1	3		
						CO3	Understand the fundamentals of hardware, software, and programming.													3			2	1	3	
						CO4	Understand the logic building used in Programming.					2		1									2	1	3	

Fundamentals of Computer and C Programming Lab	BMATSI-205	2	1	30	002	CO1	Implement programs using C	1	1	2	1	1	2	2	2	3	3	3	2	1	2	3
		CO2	Implement fundamental data structures in C. Isomorphism of vector space and Null space etc.	1		2	1	1	2	2	2	3	3	3	3	2	1	2	3			
		CO3	Write the programming solutions for solving various real-life problems. augmented matrix, using rank.	1		2	1	1	1	3	2	3	3	3	3	2	1	2	3			
		CO4	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.	1		2	1	1	1	3	2	3	3	3	3	2	1	2	3			
Environmental Science	BMNCC0-003	2	4	60	310	CO1	Understand the value of non-renewable Resources such as petroleum and natural gas.	1	1	2	1	1	2	2	2	3	3	3	2		3	
		CO2	Learn that how the bodies of living organisms decomposes after death.	1		2	1	1	2	2	2	3	3	3	3	2		2				
		CO3	Find out the causes of distinct sorts of pollution and their solutions	1		2	1	1	1	3	2	3	3	3	3	2		3				
		CO4	Grasp knowledge that how the rain water can be stored and used while climate changes like draught.	1		2	1	1	1	3	2	3	3	3	3	2		2				
Differential equations-I	BMATSI-301	3	4	60	310	CO1	Understand the concept of ordinary differential equation, formation and order and degree of differential equation etc.	2			2	1	2	2	3					2	3	1

						CO2	Apply various methods to Solve first order non-linear differential equation and linear differential equations of higher order	1			3	1	2	2	3			2		3	2	
						CO3	Apply various power series methods to find series solution of differential equations.	2			3	1	2	1	1			1		1	2	
						CO4	Apply differential equations to significant applied and theoretical problems.	2			3	1	2	2	2			1		1	2	

Mathe- matical	BMATS	3	4	60	3 1 0	CO1	Understand and use the concept of probability theory and statistics to solve industrial problems	2	1		2	3		1			2	1	1	2		
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Object Oriented Programming	BMATS1-305	3	4	60	3 1 0	CO3	Familiarize with Arithmetic modulo p and related theorems, Solving congruences modulo prime powers.	1	2		1		1	2					1			
						CO4	Learn about Euler's Phi function, Euler's theorem and properties of the Phi Function	1	2		1		1	3								
Object Oriented Programming	BMATS1-305	3	4	60	3 1 0	CO1	Implement programs using C++.	1	1	1	1	1	2	2	2	3	3	3	2	1	2	3
						CO2	Implement fundamental data structures in C++.	1	2	1	1	2	2	2	3	3	3	3	2	1	2	3
						CO3	Learn various concepts of object-oriented approach towards problem solving.	1	2	1	1	1	3	2	3	3	3	3	2	1	2	3
						CO4	Create computer-based solutions to various real-world problems using Object oriented programming.	1	2	1	1	1	3	2	3	3	3	3	2	1	2	3
Object Oriented Programming	BMATS1-306	3	1	30	0 0 2	CO1	Implement programs using C++.	1	1	1	1	1	2	2	2	3	3	3	2	1	2	3
						CO2	Implement fundamental data structures in C++.	1	2	1	1	2	2	2	3	3	3	3	2	1	2	3

						CO3	Learn programming from real world examples.	1	2	1	1	1	3	2	3	3	3	3	2	1	2	3
						CO4	Create simple programs using classes and objects	1	2	1	1	1	3	2	3	3	3	3	2	1	2	3
Differential equations-II	BMATSI -401	4	4	60	3 1 0	CO1	Understand the concept of partial differential equation of first order (linear and nonlinear).	2			2	1	2	2	3			1		2	2	
						CO2	Solve partial differential equations (linear and nonlinear) using various methods and apply these methods in solving some physical problems.	1			3	1	2	2	3			2		1	2	
						CO3	Understand the formation and solution of some significant PDEs like wave equation, heat equation and diffusion equation	2			3	1	2	1	1			1		2	1	
						CO4	Undertake any advanced course on ordinary as well as partial differential equations	2			3	1	2	2	2			1		2	1	
Linear Algebra	BMATSI-402	4	4	60	3 1 0	CO1	Apply the knowledge of Algebra which enables to build mathematical thinking and skill.	1	2									1		2		
						CO2	Analyze& solve problems related to Rank and Nullity of linear transformation etc.	2		1	3									2		
						CO3	Find eigenvalues and corresponding eigenvectors for a square matrix.	2			1			2	1					1		
						CO4	Identify the problems in mathematics and find their suitable solution.	1		1	2			3						2		

Mechanics-I	BMATSI-403	4	4	60	3 1 0	CO1	Use Lagrange's equation for deriving equation of motions			2	2	3					2			1	3			
		CO2	Apply the knowledge in Dynamics at higher levels.				1	2	3	3	2					2					3			
		CO3	Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long before the mathematical theory given by Newton.				2	1	2	3												2	3	
		CO4	Study mechanical systems under generalized coordinate systems, Virtual work, Energy and momentum, to study mechanics developed by Lagrange, Hamilton, Jacobi and small oscillation					3		2	3	3				3	2					2	3	
Numerical Methods	BMATSI-404	4	4	60	3 1 0	CO1	Learn various types of numerical methods to find the roots of nonlinear equations and solution of a system of linear equations.	3	3		2	3	1	2	2			2			2	1	2	
		CO2	Find values for a tabulated function using Interpolation techniques.	1		2		3	2	1	2					2					1	2	1	
		CO3	Apply these numerical methods to solve ordinary differential equation.	2				3	2	1	1	2				1						3	1	2
		CO4	Introduce the basic concepts of Numerical Mathematics to solve the problems arising in science and engineering etc.	1		1		3	3	1	2	1				2						1	3	2

Latex and R	BMATS1-405	4	4	60	3 1 0	CO1	Use Latex, Basic tools for Formatting text.		2	2					1				2	2	2		
						CO2	Producing Mathematical Formulae using Latex.			1		3	2			2				2	1	2	
						CO3	Able to formulate arrays and matrices		2		1		2				2				2	2	3
						CO4	Consequently students can write research papers and prepare presentations.				3		2					2			2	1	2
Latex and R lab	BMATS1-406	4	1	30	0 0 2	CO1	Use Latex, Basic tools for Formatting text		2	2					1				2		3		
						CO2	Producing Mathematical Formulae using Latex			1		3	2			2				1	2	3	
						CO3	Arrays and Matrices	2			1		2				2				1		3
						CO4	Consequently students can write research papers and prepare presentations.				3		2		3			2			2	2	3
Mechanics-II	BMATS1-501	5	4	60	3 1 0	CO1	Thorough understanding of dynamics is essential to understanding any modern development of Physical sciences.			2	2	3				2			1	3			
						CO2	Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long before the mathematical theory given by			1	2	2	3	2			2			2	3		

Finite Element Methods	BMATS1-504	5	4	60	3 1 0	CO1	Demonstrate the steps of finite element methods in finding solution of Dynamic, Heat transfer, Solid Mechanics and Eigen value problems			2	2	3						2	3				
		CO2	Analyze the real time situations and convert it into Finite Methods to find solutions				1	2			2								2				
		CO3	Solve the Ordinary differential equations with Finite Element Method	2				1			2									3			
		CO4	Solve Elliptic, Hyperbolic and Parabolic P.D.E by Finite Element Method					3			2		3			2				3	1		
MATLAB	BMATS1-505	5	4	60	3 1 0	CO1	Use MatLab for Basic mathematics computations	1	2	1	1	1	2	2	2	3	3	3	2	1		3	
		CO2	Creating M-files, working with script tools and also writing script file	1		2	1	1	2	2	2	3	3	3	3	2	2	2	1	2			
		CO3	Program scripts and functions using the MatLab development environment, Able to use basic flow controls (if else, for, while).	1		2	1	1	1	3	2	3	3	3	3	2	2					2	
		CO4	Use matlab for calculus, numerical integration and other mathematical operations.	1		2	1	1	1	3	2	3	3	3	3	2	1					3	
MATLAB Lab	BMATS1-506	5	1	15	0 0 2	CO1	Understand the main features of the MatLab development environment	1	2	1	1	1	2	2	2	3	3	3	2	2	2	3	
		CO2	Design simple algorithms to solve problems	1		2	1	1	2	2	2	3	3	3	3	2	2	2	2	3			
		CO3	Write simple programs in MatLab to solve scientific and mathematical problems	1		2	2	1	1	3	2	3	3	3	3	2	1	1	1	3			

						CO4	Understand the main features of the MATLAB/SCILAB program development environment.	1	2	1	1	1	3	2	3	3	3	3	2	2	1	2	
LPP	BMATSI-601	6	4	60	3 1 0	CO1	Introduce and formulate linear programming models of real life situations.	1	2										1	1	1		
						CO2	Understand the selection and implementation of graphical solution and variants of simplex method for the solution of LPP.		1		1	2	1	1			1	1	2	2	2		
						CO3	Develop the relationships between the primal and dual problems and their solutions.				1	2					1	2	1				
						CO4	Apply the knowledge to solve two-person zero-sum game problems	1	1			2	1	1				2	2	1	1		
Complex Analysis	BMATSI-602	6	4	60	3 1 0	CO1	Understand calculus of complex functions also concept and consequences of analyticity and Cauchy-Riemann equations .	3	3	2	3	3	2	2	3	3	1	1	1	3	1		
						CO2	Understanding Geometrical interpretation of Complex functions especially bilinear and conformal transformations.	3	3	2	3	3	2	2	3	3	1	1	1	3	1		
						CO3	Formulation of analytic functions and their applications.	3	3	2	3	3	2	2	3	3	1	1	1	3	2		
						CO4	Represent complex functions as Taylor, power and Laurent series, classification of singularities .	3	3	2	3	3	2	2	3	3	1	1	1	3	3		

Mathematical Modelling	BMATS1-603	6	4	60	3 1 0	CO1	Demo Understand the concept of several modelling techniques and analyze the resulting systems	1	1			3	1	2	3				3	1				
		CO2	Analyze and construct mathematical models inspired by real life problems.	1		2		2	3	1	2	3								3	1	1		
		CO3	The use of mathematics software to observe the implementations of the above mentioned methods efficiently, and to enhance the problem solving skills.	2		3		2	2	2	1	2	3		2						3	2	1	
		CO4	Solve physical problems using differential equations. nstrate the steps of finite element methods in finding solution of Dynamic, Heat transfer , Solid Mechanic and Eigen value problems	1		2		1	2	1											3	2		
Discrete Mathematics	BMATS1-604	6	4	60	3 1 0	CO1	Significant concepts of partial order relations, Recurrence relations, Boolean algebra, Lattices and Graph Theory.		1		2		3							3	2	2		
		CO2	To understand logical concepts and to show logical equivalences by using truth tables and rules in logics.					3	2				2		2						2	1	2	
		CO3	Appreciate the definition and basics of graphs along with types and their examples.					2		2					3							2	1	2
		CO4	Understand the definition of a tree and learn its applications to fundamental circuits. Know the applications of graph theory to network flows. Relate the graph	1				1		2						2						2	1	2

						theory to the real-world problems.															
Financial mathematics	BMATS1-605	6	4	60	310	CO1	Quantitative analysis of financial transactions, understanding of different types of interest rates.	1		2	1		2		1		2		3	1	
						CO2	Accumulated sum of annual annuity and of P-due annuity.		1	1		2		2		2		2		2	1
						CO3	Understand the concepts related to financial transactions yield.			2	2					1		2		2	1
						CO4	Analyze real investments with different yields.					2	3		2		2		2		2

Enter Correction levels 1, 2 or 3 as defined below:

1. Slight (Low) - upto 30% 2. Moderate (Medium) – above 30% and upto70% 3. Substantial (High) – above 70%