SARVAJANIK UNIVERSITY
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Sarvajanik University
Sarvajanik College of Engineering & Technology, Surat
Bachelor of Technology (B. Tech.)

B. Tech. Semester I

Subject Name: Mathematics - 1 **Subject Code: BTAS11103**

Type of course: Basic Science
Prerequisite: Fundamentals of Calculus, Algebra, Trigonometry, Geometry
Rationale: The study of rate of changes, understanding to compute area, volume and express the function in terms of series, to apply matrix algebra.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	1	0	4	60	25	15	0	0	100

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Infinite Sequence and Series:** Convergence and divergence of sequences, The Sandwich Theorem for Sequences, The Continuous Function Theorem for Sequences, Bounded Monotonic Sequences, Convergence and divergence of an infinite series, geometric series, telescoping series, n^{th} term test for divergent series, Combining series, Harmonic Series, Integral test, The p - series, The Comparison test, The Limit Comparison test, Ratio test, Root test, Alternating series test, Absolute and Conditional convergence	09	20%
2.	**Successive Differentiation and Expansion of functions:** Leibnitz Rule for nth derivative, Power series, Taylor's series, Maclaurin's series	04	20 %
	Indeterminate Forms and L'Hôspital's Rule.	02	
	Applications of Definite Integral: Parameterization of curves, Length of plane curves, Volume using cross-sections Areas of Surfaces of Revolution	03	
3.	**First order Ordinary Differential Equations:** Exact, linear and Bernoulli's equations, Equations not of first degree:	07	15 %

Sr. No.	Topics	Teaching Hrs.	Module Weightage
	equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.		
4.	**Partial derivatives and its applications:** Functions of several variables, Limits and continuity, Test for nonexistence of a limit, Partial differentiation, Mixed derivative theorem, differentiability, Chain rule, Implicit differentiation, Euler's Theorem, total differentiation (error & approximation), Jacobian, Local extreme values, Method of Lagrange Multipliers.	10	25 %
5.	**Matrices and system of linear equations:** Elementary row operations in Matrix, Row echelon and Reduced row echelon forms, Rank by echelon forms, Inverse by Gauss-Jordan method, Solution of the system of linear equations by Gauss elimination and Gauss Jordan method, Eigen values and Eigen vectors of a matrix, Cayley-Hamilton theorem, Diagonalization of a matrix.	10	20%

Suggested Specification Table of Marks as per Bloom's Taxonomy (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	**40**	**40**	**0**	**0**	**0**

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels.

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Thomas' Calculus, Early Transcendentals	Maurice D. Weir, Joel R. Hass	Pearson/ ISBN: 9780321884077	2014	13th
2.	Calculus	Howard Anton,	Wiley/ ISBN:	2016	10th

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
		IrlBivens, Stephens Davis	9781118404003		
3.	Calculus: Early Transcendentals with Course Mate	James Stewart	Cengage Learning India / ISBN: 9788131531891	2012	7th
4.	Elementary Linear Algebra, Applications version	Anton and Rorres	John Wiley & Sons Inc/ISBN:9781118434413	2013	11th
5.	Calculus, Volumes 1	T. M. Apostol	Wiley India/ ISBN: 9788126515196	2009	2nd
6.	Calculus, Volumes 1I	T. M. Apostol	Wiley India/ ISBN: 9788126515202	2009	2nd
7.	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India/ISBN: 9781118049273	2010	10th
8.	A text book of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications/ ISBN: 9788170089926	2007(Reprint: 2008,2009. 2010)	7th
9.	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers/ ISBN:8174091157	2010	36th

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	define convergence or divergence of sequences and series. *(R, U, A-Cognitive level)*	20
CO-2	find the nth derivative, using it expand the functions as a power series, identify the indeterminate forms and recall the limits, apply integral calculus to applications of definite integrals *(R, U, A-Cognitive level)*	20
CO-3	demonstrate mathematical model, identify appropriate methods to solve the first order Differential equations and interpret the results *(R, U, A-Cognitive level)*	15

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-4	define the procedures of differentiation of functions of one or more variables, compute related rates and extreme value problems. *(R, U, A-Cognitive level)*	25
CO-5	solve the system of linear equations and differentiate and list the cases for existence of the solution, apply essential tools of matrices in finding eigen values and diagonalization. *(R, U, A-Cognitive level)*	20

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	3	3	2	2	1	-	-	-	-	-	-	-			
CO-2	3	3	2	2	1	-	-	-	-	-	-	1			
CO-3	3	3	3	3	2	-	-	-	-	-	-	2			
CO-4	3	3	2	2	2	-	-	-	-	-	-	2			
CO-5	3	3	3	3	2	-	-	-	-	-	-	2			
Rationale*	15	15	12	12	8	-	-	-	--	-	-	7			

***Rationale:** All CO's are compatible and matching to the derived POs to several extents. Mathematical techniques and its applications help to analyse the real-world problems through science and technology viewpoints. From this, new ideas can be executed for the modification of existing systems for better outcomes, which satisfy and further justify the programme's outcomes.

List of Open Source learning website: NPTEL

- https://nptel.ac.in/courses/111/105/111105121/
  - It covers major topics of the syllabus.
- https://nptel.ac.in/courses/111/105/111105134/
  - It covers major topics of the syllabus.

List of Open Software: Nil