SCHEME OF COURSE WORK

Course Details:			
Course Title	**Mathematics-I**		
Course Code	**15BM1101**		**L T P C 3 0 0 3**
Program:	**B.Tech.**		
Specialization:	**INFORMATION TECHNOLOGY**		
Semester	**I Semester**		
Prerequisites	Basic formulae of differentiation, product rule, and quotient rule. Basic Integration formulae, integration by parts, definite integrals and properties Basic concept of partial differentiation		
Courses to which it is a prerequisite	**: For all Engineering Courses**		

PROGRAM OUTCOMES:

A graduate of Information Technology Engineering will be able to

PO1: Apply the knowledge of mathematics, science, engineering fundamentals and principles of Information Technology to solve problems in different domains.

PO2: Analyze a problem, identify and formulate the computing requirements appropriate to its solution.

PO3: Design and develop software components, patterns, processes, Frameworks and applications that meet specifications within the realistic constraints including societal, legal and economic to serve the needs of the society

PO4: Design and conduct experiments, as well as analyze and interpret data

PO5: Use appropriate techniques and tools to solve engineering problems.

PO6: Understand the impact of Information technology on environment and the evolution and importance of green computing.

PO7: Analyze the local and global impact of computing on individual as well as on society and incorporate the results in to engineering practice.

PO8: Demonstrate professional ethical practices and social responsibilities in global and societal contexts.

PO9: Function effectively as an individual, and as a member or leader in diverse and multidisciplinary teams.

PO10: Communicate effectively with the engineering community and with society at large.

PO11: Understand engineering and management principles and apply these to one’s own work, as a member and Leader in a team, to manage projects.

PO12: Recognize the need for updating the knowledge in the chosen field and imbibing learning to learn skills.

Course Outcomes (COs):

1	Develop the ability to solve linear differential equations of first and higher order and use the knowledge gain to certain engineering problems.
2	Appraise the Laplace transform technique and use it to solve various engineering problems.
3	Apply the techniques of multivariable differential calculus to determine extrema and series expansions etc. of functions of several variables.
4	Extend the concept of integration to two and three dimensions and support it through applications in engineering mechanics.
5	Generalize calculus to vector functions and interpret vector integral theorems.

Course Outcome versus **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	S	S										
CO-2	S	M										
CO-3	S	S										
CO-4	S	S										
CO-5	S	S										

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Linear differential equations of second higher order with constant coefficients.	**CO-1**	1. solve (+ ^{2}) = 2. Solve $(D^2 - D)\, y = ye^{x} + 1 + 2x$	Lecture / Problem solving	Assignment (Week 2 - 4) / Quiz-I
2	Method of Variation of parameters	**CO-1**	D^2 a Solve (+ 1) = sec by	Lecture /	(Week -8)/ Mid-Test 1 (Week 9) Assignment
			D^2 y x		

	Cauchy’s Linear Differential Equations		method of parameters	Problem solving	(Week 2 - 4)/ Quiz -I (Week -8)/ Mid-Test 1 (Week 9)
3	Orthogonal trajectories, Newton’s law of cooling, Models on R-L-C circuits.	**CO-1**	Show that the family of confocal and coaxial parabolas $y^2 = 4a(x+a)$ where a is an arbitrary constant are self orthogonal.	Lecture / Problem solving	Mid-Test 1 (Week 9)/ Assignment (Week 2 - 4)/ Quiz -I (Week -8)
4	Laplace transform of elementary functions, Properties of Laplace transform, Transforms of Periodic function, Transforms of derivatives and integrals, Multiplication by t^n, division by t	**CO-2**	Find the Laplace transform of $f(t) = \frac{e^{-t}\sin t}{t}$	Lecture / Problem solving	Mid-Test 1 (Week 9)/ Quiz -I (Week -8)
5	Evaluation of integrals by Laplace transforms, Elementary Inverse transforms, Inverse transform of Derivatives and Integrals.	**CO-2**	Find the inverse Laplace transform of the following function $\frac{s+2}{s^2(s^2-s-2)}$	Lecture / Problem solving	Mid-Test 1 (Week 9) / Quiz -I (Week -8)
6	Convolution theorem, Unit step function, second shifting theorem	**CO-2**	Using convolution theorem, evaluate $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$	Lecture / Problem solving	Mid-Test 1 (Week 9)/ Quiz -I (Week -8)
7	Unit impulse function, Application of Laplace transforms to ordinary differential equations (initial and boundary value problems)	**CO-2**	Solve $(D^2 + 4D + 3)\,y = e^{-t}$ given that $y(0) = y'(0) = 1$ at $t = 0$ by using Laplace transform.	Lecture / Problem solving	Mid-Test 1 (Week 9) / Quiz -I (Week -8)
8	Total derivative, change of variables Jocobians	**CO-3**	If $x = u(1-v)$, $y = uv$, then find $\frac{\partial(x,y)}{\partial(u,v)}$	Lecture / Problem solving	Mid-Test 1 (Week 9) / Quiz -I (Week -8)
9	**Mid-Test 1**	-----	**-----------**	-------	-----------
10	Taylor’s theorem for functions of two variables	**CO-3**	Find the Taylor’s series expansion of $e^x \sin y$ in powers of x and y	Lecture / Problem solving	Mid-Test 2 (Week 18) / Quiz -II (Week -17)/ Assignment (12-14)
11	Maxima and minima of functions of two variables, Lagrange method of undetermined multipliers	**CO-3**	In the plane triangle ABC, find the maximum value of $\cos A \cos B \cos C$	Lecture / Problem solving	Assignment (Mid-Test 2 (Week 18) / Quiz -II (Week -17)/ Assignment (12-

					14)
12	Non Cartesian Coordinates, Double integrals, Change of order of integration.	**CO-3**	Evaluate $\int_{-1}^{2}\int_{x^2}^{x+2} d \quad d$.	Lecture / Problem solving	Mid-Test 2 (Week 18) / Quiz -II (Week -17)/ Assignment (12-14)
13	Double integral in polar co-ordinates Triple integrals, Change of variables in double integral.	**CO-3**	Evaluate $\int_{0}^{\infty}\int_{0}^{\infty} e^{-(x^2+y^2)} d$ by changing to polar coordinates.	Lecture / Problem solving	Mid-Test 2 (Week 18) / Quiz -II (Week -17)
14	Change of variables in triple integral, Simple Applications of multiple integrals : Area enclosed by a plane curves.	**CO-3**	Evaluate $\int_{x=0}^{1}\int_{y=0}^{x}\int_{z=0}^{x+y} x \, d$.	Lecture / Problem solving	Mid-Test 2 (Week 18) / Quiz -II (Week -17)
15	Differentiation of vectors, Scalar and vector point functions Gradient of a scalar function, properties, Directional derivative, Divergence of a vector point function and it's physical interpretation, Curl of a vector point function, properties, Physical interpretation of Divergence and Curl of a vector point function, Del applied twice to point functions	**CO-4**	Find angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $x^2 + y^2 - z = 3$ at $(2, -1, 2)$.	Lecture / Problem solving	Mid-Test 2 (Week 18) / Quiz -II (Week -17)
16	Line integral, circulation, work done, surface and volume integrals	**CO-5**	Evaluate $\iint_R e^{2x-3y} d$ over the triangle bounded by $x = 0$, $y = 0$ $+ \quad = 1$	Lecture / Problem solving	Mid-Test 2 (Week 18) / Quiz -II (Week -17)
17	Green's theorem in the plane, Stoke's theorem, Gauss Divergence theorem and related problems	**CO-5**	Verify Divergence theorem for $\bar{F} = 4xi - 2y^2 j + yz^2 k$ taken over the region bounded by the cylinder $x^2 + y^2 = 4$, $z = 0$ a $z = 3$.	Lecture / Problem solving	Mid-Test 2 (Week 18) / Quiz -II (Week -17)
18	**Mid-Test 2**				
19/20	**END EXAM**				