



**SRI RAMAKRISHNA INSTITUTE OF TECHNOLOGY
COIMBATORE-10**
(Approved by AICTE, New Delhi & Affiliated to Anna University)
DEPARTMENT OF SCIENCE AND HUMANITIES



Course Code & Title	MA6151 & Mathematics – I		L T P C 3 1 0 4
Class	I B.E (MECHANICAL) - A	Semester	I
Regulation	Anna University, Chennai, R 2013.		
Course Prerequisite	BASIC MATHEMATICS		
Objectives	<ul style="list-style-type: none"> ✓ To develop the use of matrix algebra techniques this is needed by engineers for practical applications. ✓ To make the student knowledgeable in the area of infinite series and their convergence so that he/ she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling. ✓ To familiarize the student with functions of several variables. This is needed in many branches of engineering. ✓ To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications. ✓ To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage. 		
Expected Outcomes	<ul style="list-style-type: none"> ❖ An ability to apply knowledge of mathematics, science and engineering. ❖ An ability to function on multidisciplinary teams. ❖ An ability to identify, formulate and solve engineering problems. ❖ An ability to use the techniques, skills and modern engineering tools necessary for engineering practice. 		
Relationship of course to programme objectives	<p>Graduates of Mechanical Engineering Programme will</p> <ul style="list-style-type: none"> ○ Be able to apply the principles of Mechanical engineering, to solve real time problems and succeed in their career. ○ Be able to contribute and communicate effectively in multidisciplinary projects and perform services related to Mechanical engineering to meet the customer requirements in both quality and quantity. ○ Update the modern trends in engineering and technology through continuous learning and be the leaders in their profession. 		
References	<p><u>TEXT BOOKS:</u></p> <ul style="list-style-type: none"> • Bali N. P and Manish Goyal, “A Text book of Engineering Mathematics”, Eighth Edition, Laxmi Publications Pvt Ltd., (2011). • Grewal. B.S, “Higher Engineering Mathematics”, 41st Edition, Khanna Publications, Delhi, (2011). <p><u>REFERENCES:</u></p> <ul style="list-style-type: none"> • Dass, H.K., and Er. Rajnish Verma,” Higher Engineering Mathematics”, S. Chand Private Ltd., (2011). • Glyn James, “Advanced Modern Engineering Mathematics”, 3rd Edition, Pearson Education, (2012). • Peter V. O’Neil,” Advanced Engineering Mathematics”, 7th Edition, Cengage learning,(2012). • Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, (2008). 		

Mode of Evaluation	1. Internal Assessment (20) As per Regulation – 2013, 20 marks are allotted for three assessment tests. ✓ First assessment test (based on the syllabus of bridge course) - 4 marks ✓ Second assessment test - 8 marks ✓ Third assessment test - 8 marks Tests will be conducted as per the schedule given by the university.
	2.External Assessment (80) University will conduct end semester examination for 100 marks (10*2=20 & 5*16=80). Performance will be considered for assessment out of 80
Faculty	Mr.M. Vijaya Kumar

COURSE PLAN II

Unit	Topics to be covered as per curriculum	Reference	Period
I	MATRICES		
	Eigen values and Eigenvectors of a real matrix, Characteristic equation, Properties of eigen values and eigen vectors	R4: 14.1 - 14.8	3
	Tutorial I		1
	Statement and applications of Cayley-Hamilton Theorem	R4: 14.9 – 14.12	2
	Diagonalization of matrices	R4: 14.13 – 14.17	1
	Tutorial II		1
	Reduction of a quadratic form to canonical form by orthogonal transformation - Nature of quadratic forms	R4: 14.18 – 14.26	3
	Tutorial III		1
	Total		12
II	SEQUENCES AND SERIES		
	Sequences - Definition and examples, Series: Types and Convergence	R1: 1005 - 1008	1
	Series of positive terms - Comparison test	R1: 1009 - 1016	2
	Tutorial I		1
	D'Alembert's ratio test	R1: 1017 – 1020	1
	Integral test	R1: 1027 - 1028	1
	Alternating series – Leibnitz's test	R1: 1035 – 1037	1
	Tutorial II		1
	Series of positive and negative terms, Absolute and conditional convergence.	R1: 1038 - 1040	3
Tutorial III		1	
Total		12	
III	APPLICATIONS OF DIFFERENTIAL CALCULUS		
	Curvature in Cartesian co-ordinates, radius of curvature	R4: 2.44 – 2.48	3
	Tutorial I		1
	Center and Circle of curvature, Evolutes	R4: 2.57 – 2.64	3
	Tutorial II		1
	Envelopes, Evolute as envelope of normals	R4: 2.65 – 2.75	3

	Tutorial III		1
	Total		12
IV	DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES		
	Limits and Continuity – Partial derivatives	R1: 1 – 36	2
	Total derivative	R1: 37 - 50	1
	Tutorial I		1
	Differentiation of implicit functions	R1: 51 - 54	1
	Jacobian and properties	R1: 97 - 118	1
	Taylor’s series for functions of two variable	R1: 122 - 132	1
	Tutorial II		1
	Maxima and minima of functions of two variables	R1: 59 - 71	2
	Lagrange’s method of undetermined multipliers	R1: 72 - 86	1
	Tutorial III		1
	Total		12
	V	MULTIPLE INTEGRALS	
Double integrals in Cartesian and polar coordinates		R1: 133 - 142	2
Change of order of integration		R1: 143 - 152	1
Tutorial I			1
Change of variables in double integrals		R1: 153 - 158	2
Area enclosed by plane curves, Area of a curved surface		R1: 159 - 164	1
Tutorial II			1
Triple integrals		R1: 173 - 176	1
Volume of Solids		R1: 182 - 194	2
Tutorial III			1
Total			12

Total Hours: 60

Bridging the Curriculum Gap

Unit	Topics to be covered as per curriculum	Period
I	Matrices, Vector Algebra and Partial Fractions	
	Relations between matrices and determinants – Representation of two variable linear equations – Representation of two variable non - linear equations.	1
	Classification of vectors – Linear combination of vectors – Components of a vector in two and three dimensions – Direction ratios & Direction cosines and counter examples.	1
	Proper and Improper fractions – Types of partial fractions.	1
	Total	3

	Series & Sequences, Analytical Geometry (Two Dimensions) and Trigonometric Functions	
II	Link between series and sequences – Validity of series	1
	Convergence – Divergence – Counting Principles. Basic concepts - Point – Line - Slope – Straight line – Parallel lines.	1
	Domain – Co domain of all trigonometric functions – Notion of hyperbolic functions – Relation between circular and hyperbolic functions.	1
	Total	3
	Differential Calculus	
III	Theory of equations: Relation between roots and coefficients – expressions- equations and factors.	1
	Theory of limits: Limit of a function – Left and right limits (examples) Concepts of continuity: At a point- in an interval – discontinuous function.	1
	Differentiability: Link between differentiability and continuity-left derivative and right derivative (closed interval and open interval). Techniques of differentiation: Total and partial derivatives up to the second order.	1
	Total	3
	Integral Calculus	
IV	Proper and improper integrals – Definite integrals - Indefinite integrals	1
	Integration by parts – Bernoulli’s formula	1
	Integration by using partial fraction – Reduction formula.	1
	Total	3
	Differential Equations	
V	Linear – non linear – homogeneous and non- homogeneous equations – Order –Degree – Need of Differential equations and importance	1
	Relation between constant coefficients and variable coefficients	1
	Formation of differential equations	1
	Total	3

Total Hours 15