

- Appreciate the importance of physics of materials for various engineering applications.

EVALUATION METHOD TO BE USED:

Sl. no	Category of Courses	Continuous Assessment	Mid – Semester Assessment	End Semester
1.	Theory Integrated with Practical	15(T) + 25 (P)	20	40

MA6151 -I	MATHEMATICS	L	T	P	EL	CREDITS		
		3	1	0	3	5		
OBJECTIVES: <ul style="list-style-type: none">To gain proficiency in calculus computations.To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.To familiarize the student with functions of several variables.To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.								
MODULE I		SINGLE VARIABLE FUNCTIONS			L	T	P	EL
					3	1	0	3
Representation of functions - New functions from old functions - Limit of a function - Limits at infinity -Continuity.								
SUGGESTED ACTIVITIES : <ul style="list-style-type: none">Problem solving sessions								
SUGGESTED EVALUATION METHODS: <ul style="list-style-type: none">Tutorial problemsAssignment problemsQuizzes								
MODULE II		DIFFERENTIAL CALCULUS			L	T	P	EL
					3	1	0	3
Derivatives - Differentiation rules – intermediate theorem - Rolle's theorem- Maxima and Minima of functions of one variable.								
SUGGESTED ACTIVITIES : <ul style="list-style-type: none">Problem solving sessionsApplications in real life problems								
SUGGESTED EVALUATION METHODS: <ul style="list-style-type: none">Tutorial problems								

<ul style="list-style-type: none"> • Assignment problems • Quizzes 				
MODULE III FUNCTIONS OF SEVERAL VARIABLES	L	T	P	EL
	3	1	0	3
Partial derivatives – Homogeneous functions and Euler’s theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians				
SUGGESTED ACTIVITIES : <ul style="list-style-type: none"> • Problem solving sessions • Applications in real life problems 				
SUGGESTED EVALUATION METHODS: <ul style="list-style-type: none"> • Tutorial problems • Assignment problems • Quizzes 				
MODULE IV MULTI VARIABLE DIFFERENTIAL CALCULUS	L	T	P	EL
	3	1	0	3
Partial differentiation of implicit functions – Taylor’s series for functions of two variables – Maxima and minima of functions of two variables – Lagrange’s method of undetermined multipliers.				
SUGGESTED ACTIVITIES : <ul style="list-style-type: none"> • Problem solving sessions • Flipped Class room 				
SUGGESTED EVALUATION METHODS: <ul style="list-style-type: none"> • Tutorial problems • Assignment problems • Quizzes 				
MODULE V INTEGRAL CALCULUS	L	T	P	EL
	3	1	0	3
Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts				
SUGGESTED ACTIVITIES : <ul style="list-style-type: none"> • Problem solving sessions 				
SUGGESTED EVALUATION METHODS: <ul style="list-style-type: none"> • Tutorial problems • Assignment problems • Quizzes 				
MODULE VI MORE ON INTEGRAL CALCULUS	L	T	P	EL
	3	1	0	3
Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction,				

Integration of irrational functions - Improper integrals				
SUGGESTED ACTIVITIES : <ul style="list-style-type: none"> • Problem solving sessions 				
SUGGESTED EVALUATION METHODS: <ul style="list-style-type: none"> • Tutorial problems • Assignment problems • Quizzes 				
MODULE VII	MULTIPLEINTEGRALS	L	T	P
		3	1	0
Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves				
SUGGESTED ACTIVITIES : <ul style="list-style-type: none"> • Problem solving sessions • Flipped Class room 				
SUGGESTED EVALUATION METHODS: <ul style="list-style-type: none"> • Tutorial problems • Assignment problems • Quizzes 				
MODULE VIII	VOLUME INTEGRALS	L	T	P
		3	1	0
Triple integrals – Volume of solids – Change of variables in double and triple integrals.				
SUGGESTED ACTIVITIES : <ul style="list-style-type: none"> • Problem solving sessions 				
SUGGESTED EVALUATION METHODS: <ul style="list-style-type: none"> • Tutorial problems • Assignment problems • Quizzes 				
MODULE IX		L	T	P
		3	1	0
Methods of variation of parameters – Method of undetermined coefficients -				
SUGGESTED ACTIVITIES : <ul style="list-style-type: none"> • Problem solving sessions 				
SUGGESTED EVALUATION METHODS: <ul style="list-style-type: none"> • Tutorial problems • Assignment problems • Quizzes 				
MODULE X:		L	T	P
		3	1	0
Homogenous Equation of Euler's And Legendre's Type – System of Simultaneous Linear Differential Equations with Constant Coefficients.				

<p>SUGGESTED ACTIVITIES :</p> <ul style="list-style-type: none"> • Problem solving sessions
<p>SUGGESTED EVALUATION METHODS:</p> <ul style="list-style-type: none"> • Tutorial problems • Assignment problems • Quizzes

OUTCOMES:

Upon completion of the course, the students will be able to:

- Use both the limit definition and rules of differentiation to differentiate functions.
- Apply differentiation to solve maxima and minima problems.
- Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.
- Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
- Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
- Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.
- Apply various techniques in solving differential equations.

TEXTBOOKS:

1. James Stewart, "Calculus with Early Transcendental Functions", Cengage Learning, New Delhi, 2008.
2. Narayanan S. and Manicavachagom Pillai T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.
3. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

REFERENCES:

1. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2014.
3. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
4. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2009.
5. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2nd Edition, 5th Reprint, 2009.
6. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.

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