21UMBA301	Mathematics	(3 -0 -0)

ContactHours: 39 Hrs.

Course Learning Objectives (CLOs):

This coursewillenable students tomaster thebasic tools of differential&integralcalculus, differential equations andpartial differential equations. and become skilled to formulate, solve and analyzescienceand engineering problems.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	**Apply**the knowledge of calculus to solve problems related to polar curves, curvature andits applications in determiningthebentness ofacurve.	-	-	1,2
CO-2	**Solve**multiple integration and use Beta and Gamma function to solve definite integrals	-	1,2	
CO-3	**Solve**first order linear differentialequations analyticallyusingstandard methods.	-	1,2	
CO-4	**Solve** higher order differential equations with constant co-efficients and variable co-efficients.	-	1,2	-
CO-5	**Learn**partial differentiationto calculaterates ofchangeofmultivariate functions.Solveproblemsrelated to composite functions andJacobians.**Solve** problems onpartial differential equations by method of separation of variables.	-		1,2

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	1.6	1.6	-	-	-	-	-	-		-	-	-

Pre-requisites:

1.Differentiation of function

2. Integration of function.

Course Content:

UnitI

DifferentialCalculus:

n^{th} order differentiation of standard functions. Leibnitz theorem (Statement only &illustrativeexamples),Taylor'sseriesforsinglevariable(Statementonly&illustrativeexamples),Maclaurin's series for single variable (Statement only & illustrative examples).

Polar curves-angle between the radius vector and tangent (Formula & illustrative examples),angle between two curves (Formula & illustrative examples).Definition of Curvature andradiusofcurvature.-RadiusofcurvatureforCartesianandpolarcurves(Formulas&illustrativeexamples) . **10hrs.**

UnitII

IntegralCalculus:

Reductionformulafor $\int_0^{\frac{\pi}{2}} sin^n x\,dx$, $\int_0^{\frac{\pi}{2}} cos^n x\,dx$ and $\int_0^{\frac{\pi}{2}} sin^n x\,cos^m x\,dx$(Formula&illustrativeexamples).

DefinitionofBetaandGammafunctions(illustrativeexamples).Relation between Beta and Gamma functions (No Proof) (illustrative examples).Evaluation of Double integral (direct and region given), Changeofvariables.EvaluationofTripleintegral(directexamples). **10 hrs.**

UnitIII

Ordinary Differential Equations of firstorder:-

Libnitz'sLinear differential equation, Bernoulli's differential equation, Exact differentialequations.Orthogonal trajectories.**5 hrs**.

UnitIV

DifferentialEquationsofhigherorder

SolutionofSecondorderLinearordinarydifferentialequationwithconstantcoefficients.Methodofvariationofparameters.Legendre'shomogeneousequations.**8 hrs.**

UnitV

PartialDifferentiation:

Definition of Partial derivative (illustrative examples), Totaldifferentiation(illustrativeexamples), DifferentiationofCompositefunctions(illustrativeexamples).Jacobiansanditsproperties(NoProof)(illustrativeexamples).

Partial Differential Equations (PDE's):

Formation of PDE's byelimination of arbitraryconstants /functions. Solution of PDE by variable separable method. **6 hrs.**

Text Books

1. **B.S. Grewal**: Higher Engineering Mathematics, Khanna Publishers, 44^{th}edition,2017.

2.**H.K.Dass&RajnishVerma**,Higher Engineering Mathematics,3^{rd} edition, 2014.

Note: 1. Grades (i) PP (ii) NP
2. No semester End Examination
3. Audit (Bridge course).

1. The mandatory non – credit courses Mathematics for III and IV semesters respectively, to the lateral entry Diploma holders admitted to III semester of BE/B.Tech., programs, shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40% of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In such a case, the student has to fulfill the requirements during subsequent semester/s to appear for CIE.
2. These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

21UMBA401Mathematics (3 -0 -0)

ContactHours: 39 Hrs.

Course Learning Objectives (CLOs):

This coursewillenable students touse Laplace transform to solve differential equations. Analyze and Solve system of linear equation .Understand the concept of vector differentiation and vector integration.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		**Mapping to POs(1-12)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Transform** the given function using Laplace transforms and study their properties.	-	-	1,2
CO-2	**Apply** Laplace transform tosolvedifferential equations.	-	-	1,2
CO-3	**Compute** the solution of system of equations. **Evaluate** Eigen values and Eigen vectors for a matrix.	-	1,2	
CO-4	**Study** vector calculus and **compute** gradient, divergence, curl of a single valued function**.**	-		1,2
CO-5	**Study** vector integrationand **evaluate** Lineintegrals,SurfaceintegralsandVolumeintegrals	-		1,2

POs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Mapping Level	1.2	1.2	-	-	-	-	-	-		-	-	-

Pre-requisites:

1.Differentiation of function

2. Integration of function.

3.Elementary row transformation of matrix.

4.Vector algebra.

Course Content:

Unit-I

Laplace Transforms:

Definition and Properties. Laplace transform of elementary functions. Laplace transform of $e^{at}f(t)$ Laplace transform of $t^n f(t)$, Laplace transform of $\frac{f(t)}{t}$,Laplace transforms of Periodic functions and unit-step function–problems.**8 hrs.**

Unit-II

Inverse Laplace Transforms

Inverse Laplace transform -problems with standard, Convolution theorem (without proof) to find the inverse Laplace transform and problems.Solution of linear differentialequations using Laplace transform. **8 hrs.**

Unit-III

Elementary Linear Algebra:

Rank ofa matrix - Row Echelon form. Test for consistency for system of linear equations. Solution of system of linear equations – Gauss-elimination method(consistency), Gauss-Seidel iterative method. Eigen values and Eigen vectors- Rayleigh's power method. **8 hrs.**

Unit-IV

VectorCalculus:-

Vector Differentiation: Scalar point function and vector point functions. Gradient, DirectionalDerivative; Curl and Divergence-physical interpretation.Solenoidal and irrotational vectors.Illustrativeproblems.**8 hrs.**

Unit- V

VectorIntegration:

Lineintegrals,SurfaceintegralsandVolumeintegrals.Green'stheorem,Gaussdivergencetheorem and Stoke's theorem (only statements). **7 hrs.**

Text Books

1. **B.S. Grewal**: Higher Engineering Mathematics, Khanna Publishers, 44th edition, 2017.
2. **Rajesh Verma&H.K.Dass,** Higher Engineering Mathematics,,3rd edition. 2014.

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all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In such a case, the student has to fulfill the requirements during subsequent semester/s to appear for CIE.

2. These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.