FIRST YEAR COURSES (UG SCHEME 2020)

Sr.No.	Course Code	Course Name	L	T	P	Credits
1	MA 1101	CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS	3	1	0	4
2	MA 1201	LINEAR ALGEBRA, VECTOR CALCULUS AND PARTIAL DIFFERENTIAL EQUATIONS	3	1	0	4
3	MA 1301	PROBABILITY AND STATISTICS	3	1	0	4

Course Name	:	**CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS**
Course Code	:	**MA 1101**
Credits	:	**4**
L T P	:	**3-1-0**
Total No. of Lectures	:	**42**

Course Objectives:
At the end of the semester, the students should be able to

1	understand the behavior of infinite series and their use.
2	learn the concepts related to differential calculus of functions of several variables and their applications.
3	learn the concept and methods of evaluating multiple integrals and their applications to various problems.
4	learn the methods to solve ordinary differential equations of various types.

	Lecture wise breakup	**No. of Lectures**
1	**INFINITE SERIES** Infinite series and convergence, alternating series, power series and convergence. Taylor's and Maclaurin's Series. (Scope as in Chapter 8, Sections 8.1, 8.3 – 8.9 of Text Book 1).	8
2	**DIFFERENTIAL CALCULUS** Limit, Continuity and Partial Derivatives; Euler's Theoem for Homogeneous functions; Differentiability, Linearization and Differentials; Chain rule; Extreme values and Saddle Points; Lagrange multipliers; Taylor's Formula**. (**Scope as in Chapter 12, Sections 12.1 – 12.6, 12.8 – 12.10 of Text Book 1).	12
3	**INTEGRAL CALCULUS** Cylinders and Quadric surfaces, Double integrals in Rectangular and Polar form, Triple integrals in Rectangular, Cylindrical and Spherical Coordinates, Substitutions in Multiple integrals. Applications to practical problems. (Scope as in Chapter10, Sections10.6 and 10.7 and Chapter 13, Sections 13.1, 13.3, 13.4,13.6 and 13.7 of Text Book 1).	10
4	**ORDINARY DIFFERENTIAL EQUATIONS** First order exact differential equations, Integrating factor, Orthogonal trajectories, Second and Higher order Linear Differential Equations with constant coefficients, Differential Operators, Methods of Variation of Parameters and Undetermined	12

	Coefficients, Euler Cauchy Equation, Wronskian. (Scope as in Chapter 1, Section 1.5, 1.8 Chapter 2, 2.1-2.4, 2.6, 2.9-2.10, 2.13- 2.15 of Text Book 2).	

Course Outcomes:

At the end of the semester, the students are able to

1	test the behavior of infinite series.
2	Apply the concepts of differential calculus of functions of several variables.
3	evaluate multiple integrals and apply them to practical problems.
4	solve ordinary differential equations of various types

Text Books:

1	Calculus and Analytic Geometry, Thomas and Finney, 9th edition, Pearson Education Asia.	2006
2	Advanced Engineering Mathematics, Kreyszig, 8th edition, John Wiley and Sons.	2005

Reference Books:

1	Differential Equations, Frank Ayers, SI edition, Mc Graw Hill.	1972
2	Advanced Engineering Mathematics, Wylie and Barrett, 6th edition, Mc Graw Hill.	2003

Course Name	:	**LINEAR ALGEBRA, VECTOR CALCULUS AND PARTIAL DIFFERENTIAL EQUATIONS**
Course Code	:	**MA 1201**
Credits	:	**4**
L T P	:	**3-1-0**
Total No. of Lectures	:	**42**

Course Objectives:
At the end of the semester, the students should be able to

1	learn the various concepts associated with real vector spaces and theory of matrices
2	learn the various concepts of vector calculus and their applications to problems.
3	formulate and solve linear and nonlinear partial differential equations and apply to engineering problems.

	Lecture wise breakup	**No. of Lectures**
1	**ALGEBRA** Vector spaces over reals, Linear dependence, Basis, Dimension, Co-ordinates with respect to a basis, Change of basis, Subspace, Linear transformation $R^n \rightarrow R^m$, Range space and Rank, Null space and Nullity, Rank and Nullity relation, Matrix representation of a linear transformation, Similar matrices, Invertible linear transformation, Eigenvalues and eigenvectors, Cayley Hamilton theorem, Diagonalization of a matrix.	16
2	**VECTOR CALCULUS** Gradient, Divergence and Curl – their physical interpretation, Line, Surface and Volume integrals, Green's theorem in the plane, Stoke's theorem, Divergence theorem, Applications to Science and Engineering.	14
3	**PARTIAL DIFFERENTIAL EQUATIONS** Formation and solution of first order partial differential equations, Linear equations of higher order with constant coefficients, Applications to Engineering problems**.**	12

Course Outcomes:

At the end of the semester, the students are able to

1	solve the various problems related to real vector spaces and theory of matrices
2	apply various concepts of vector calculus to problems.
3	formulate and solve linear and nonlinear partial differential equations and apply to engineering problems.

Text Books:

1	Introductory Linear Algebra with Applications, Kolman, B. and Hill, D. R., 7th edition, Pearson Education.	2001
2	Advanced Engineering Mathematics, E. Kreyszig, 8th Edition, John Wiley.	2005

Reference Books:

1	Elements of Partial differential equations, Sneddon, Mc Graw Hill.	1957
2	Advanced Engineering Mathematics, Wylie and Barrett, 6th edition, Mc Graw Hill.	2003

Course Name	:	**PROBABILITY AND STATISTICS**
Course Code	:	**MA 1301**
Credits	:	**4**
L T P	:	**3-1-0**
Total No. of Lectures	:	**42**

Course Objectives:
At the end of the semester, the students should be able to

1	understand the concepts of random variable and probability distribution.
2	learn the concepts of some theoretical probability distributions .
3	understand the concept of sampling distribution and be able to construct and interpret confidence interval estimates for the mean , proportion , difference of mean and proportion
4	learn to use various tests of hypotheses

	Lecture wise breakup	**No. of Lectures**
1	**RANDOM VARIABLES** Random variables, Discrete, Continuous and Joint Probability distributions, Marginal and Conditional distributions, Independent random variables, Expectation, Variance and Covariance, Means and variances of linear combinations of random variables, Chebyshev's inequality	10
2	**PROBABILITY DISTRIBUTIONS** Binomial, Poisson, Uniform and Normal distributions, Normal and Poisson approximations to Binomial, Moments, Moment generating function.	10
3	**SAMPLING DISTRIBUTIONS** Population, Sample, Sampling distributions, Central limit theorem, Distribution of sample mean, Difference of means, Proportions and difference of proportions, Chi-square distribution, Student's t-distribution.	7
4	**ESTIMATION** Estimation of parameters, Point estimate, Confidence interval for mean, difference of means and proportions.	6

5	**TESTS OF HYPOTHESES** Hypothesis, Test statistic, Critical region, Significance level, Single Sample and Two Samples Tests for mean and proportion.	9

Course Outcomes:
At the end of the semester, the students are able to

1	understand the concepts of random variable and probability distribution.
2	apply the concepts of some theoretical probability distributions .
3	use the concept of sampling distribution and apply tests of significance to practical problems of engineering
4	apply various tests of hypotheses

Text Books:

1	Probability and statistics for Engineers and Scientists, Walpole, Myers, Myers and Ye, 7th edition, Pearson Education	2006

Reference Books:

1	Miller and Freund's: Prability and Statistics for Engineers, Richard A. Johnson, C.B. Gupta, Pearson Education.	2006
2	John E. Freund's: Mathematical statistics with Application, Miller and Miller, Pearson Education.	2004