Course Title: Calculus-II   **Course Code: BMA22C201**

Theory: 4 Credits (60 Hours)   **Tutorial: 2 Credits (30 Hours)**

Objectives: The aim of this course is to prepare the students for the following.

(1) To study and understand the notions of calculus and to imbibe the acquaintance for using the techniques in other sciences and engineering.

(2) To prepare the students for taking up advanced courses of mathematics.

(3) To apply differential equations to physical and real time problems.

Note: The external paper will be for first 4 units and internal assessment for tutorials (5th and 6th unit).

UNIT – I

Integration of irrational functions, reduction formulae: $\int \sin^n x\, dx$, $\int \cos^n x\, dx$, $\int \sin^n x \cos^n x\ dx$, $\int x^m (a + bx^n)^p\, dx$, $\int x^m \cos^n x\ dx$, $\int \sin^m x \sin^n x\ dx$, $\int \cos^m x \cos^n x\, dx$.

UNIT – II

Definite integral and their properties, Integrals of the type: $\int_0^n \frac{dx}{ax+bx^2}$, $\int_a^b \frac{1}{(b-x)^n} dx$, $\int_0^1 \log x$, $\int_0^{\frac{\pi}{2}} \log(\sin x)\, dx$, $\int_1^\infty x^2 e^{-x}\, dx$, $\int_e^\infty \frac{dx}{x(\log x)^n}$. Beta and Gamma functions and their properties, Relation between beta and gamma function.

UNIT – III

Differential equations, Integrating factors, Bernoulli's equation, Exact differential equation, Necessary and sufficient condition for exactness, Differential equations reducible to exact form. Symbolic Operators: Linear differential equations with constant coefficients.

UNIT – IV

First order and higher degree differential equations, solvable for x, y, z, p. Equations from which one variable is explicitly absent, Clairut's form, equations reducible to Clairut's form.

Tutorial: 2 Credits

UNIT – V

Problems on definite integrals, Beta and Gamma functions, Rectification: arc length of a curvesimple problems, Area bounded by two curves- simple problems.

UNIT – VI

Miscellaneous problems on differential equations, applications of differential equations to problems like population growth, radioactive decay, orthogonal trajectories, RLC circuits.

Recommended Books

1. Shanti Narayan and P.K. Mittal, Differential Calculus, S. Chand.
2. Schaums outline of Theory and problems of Differential and Integral Calculus.
3. S. D. Chopra and M. L. Kochar, Integral Calculus, Kapoor Sons.

Reference Books

1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc. 2002.
2. T.M. Apostal, Calculus Vol. I, John Wiley & Sons Inc.
3. S. Balachandra Rao and C. K. Shantha, Differential Calculus, New Age Publication.
4. S. Lang, A First Course in Calculus, Springer-Verlag.
5. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
6. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.
7. Suggestive digital platforms web links: NPTEL/ SWAYAM/ MOOCS.

SEMESTER – 1ˢᵗ to 3ʳᵈ

MULTIDISCIPLINARY COURSE

MATHEMATICS / APPLIED MATHEMATICS

Course Title: Basic Course in Mathematics   **Course Code: BMA22M102**

Credits: 03 (45 Hours)

Objectives: The aim of this course is to prepare the students for the following.

(1) To aware the students about set theory, real and complex numbers.
(2) To understand the basic concepts of coordinate geometry.
(3) To prepare the students for applying basic mathematics for computational purposes.

UNIT – I

Introduction to set theory: Sets, Types of sets, Subsets, Basic operations on sets, Power set, Finite set, Infinite set, Countable and Uncountable sets and their examples, Cartesian product, Basic operations, D'-Morgans laws, Relations, Equivalence relations, Partially ordered sets.

UNIT – II

Real number system, Rational and Irrational numbers, Closure property of reals, Complex numbers, equality of complex numbers, operations on complex numbers, modulus and amplitude of a complex number, polar form of a complex number.

UNIT – III

Rectangular coordinate system, distance and section formulae, equation of straight lines, various forms, angle between lines. Second degree homogenous equations representing straight lines and angle between them. Matrices and their types, algebra of matrices, determinant of a square matrix.

Recommended Books

1. Set theory Schaum's series.
2. Matrices by Aziz, Nisar and Zargar.
3. Complex trigonometry by Aziz, Nisar and Zargar.
4. Matrices by Shanti Narayan.
5. Coordinate geometry by Shanti Narayan.
6. Mathematical Analysis by S.C. Malik.