GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

BEGUMPET, HYDERABAD-16

Affiliated To Osmania University, Re-Accredited With 'B^{+}' Grade by NAAC

DEPARTMENT OF MATHEMATICS

SYLLABUS (2016-17)

SEMESTER-I
COURSE CODE: MAT101

DIFFERENTIAL AND INTEGRAL CALCULUS

COURSE OBJECTIVE:

The main aim of this course is to introduce the students to the concepts of differential and integral calculus to train to apply their skills in solving some of the problems of calculus in higher education and research.

COURSE OUTCOMES (COs):

After completion of this course, the student will be able to

CO1: Gain the understanding of partial differentiation.

CO2: Deliberate in depth functions of two variables.

CO3: Verify whether a given function is continuous or not at a given point by an understanding of the neighbourhood of a point in (a,b).

CO4: Find the limit of a function of two variables.

CO5: Apply and solve homogeneous functions.

CO 6: Differentiate composite functions and implicit functions.

CO7: Compute radius of curvature and length of arc as a function. CO 8: Determine the area of the surface of the frustum of a cone.

UNIT- I

Partial Differentiation: Introduction - Functions of two variables - Neighborhood of a point (a, b) - Continuity of a Function of two variables, Continuity at a point - Limit of a Function of two variables - Partial Derivatives - Geometrical representation of a Function of two Variables - Homogeneous Functions.

UNIT- II

Theorem on Total Differentials - Composite Functions - Differentiation of Composite Functions - Implicit Functions - Equality of fXY (a, b) and fyz(a, b) - Taylor's theorem for a function of two Variables - Maxima and Minima of functions of two variables – Lagrange's Method of undetermined multipliers.

UNIT- III

Curvature and Evolutes: Introduction - Definition of Curvature - Radius of Curvature - Length of Arc as a Function, Derivative of arc - Radius of Curvature - Cartesian Equations - Newtonian Method - Centre of Curvature - Chord of Curvature. Evolutes: Evolutes and Involutes - Properties of the evolute. Envelopes: One Parameter Family of Curves - Consider the family of straight lines - Definition - Determination of Envelope.

UNIT- IV

Lengths of Plane Curves: Introduction - Expression for the lengths of curves $y = f(x)$ - Expressions for the length of arcs $x = f(y)$; $x = f(t)$, $y = \phi(t)$; $r = f(\theta)$ Volumes and Surfaces of Revolution: Introduction - Expression for the volume obtained by revolving about either axis - Expression for the volume obtained by revolving about any line - Area of the surface of the frustum of a cone - Expression for the surface of revolution – Pappu's Theorems - Surface of revolution.

PRESCRIBED TEXTBOOK :

• Shanti Narayan, P.K. Mittal Differential Calculus, S.CHAND, NEW DELHI 5 • Shanti Narayan Integral Calculus, S.CHAND, NEW DELHI

REFERENCE BOOKS:

• William Anthony Granville, Percey F Smith and William Raymond Longley; Elements of the differential and integral calculus

• Joseph Edwards , Differential calculus for beginners

• Smith and Minton, Calculus

• Elis Pine, How to Enjoy Calculus

• Hari Kishan, Differential Calculus

SEMESTER-II

COURSE CODE: MAT101

DIFFERENTIAL EQUATIONS

COURSE OBJECTIVE:

The main aim of this course is to introduce the students to the techniques of solving differential equations and to train to apply their skills in solving some of the problems of engineering and science.

COURSE OUTCOMES (COs):

After completion of this course, the student will be able to

CO1: Gain the complete understanding of linear differential equations of first order and first degree.

CO2: Deliberate in depth differential equations of first order and first degree. CO3: Verify whether a given differential equation is exact or not.
CO4: Identify the appropriate integrating factors to make a non-exact differentiable equation to exact.

CO5: Apply and solve first order differential equations

CO6: Equipped with the various tools to solve few types differential equations that arise in several branches of science.

UNIT- I

Differential Equations of first order and first degree: Introduction - Equations in which variables are separable - Homogeneous Differential Equations - Differential Equations Reducible to Homogeneous Form - Linear Differential Equations - Differential Equations Reducible to Linear Form - Exact differential equations - Integrating Factors - Change in variables - Total Differential Equations - Simultaneous Total Differential Equations - Equations of the form $dx/P = dy/Q = dz/R$.

UNIT- II

Differential Equations first order but not of first degree: Equations Solvable for p - Equations Solvable for y - Equations Solvable for x - Equations that do not contain x (or y)- Equations Homogeneous in x and y - Equations of the First Degree in x and y - Clairaut's equation. Applications of First Order Differential Equations : Growth and Decay

- Dynamics of Tumour Growth - Radioactivity and Carbon Dating - Compound Interest - Orthogonal Trajectories.

UNIT- III

Higher order Linear Differential Equations: Solution of homogeneouslinear differential equations with constant coefficients - Solution of non-homogeneous differential equations P (D)y = Q(x) with constant coefficients by means of polynomial operators when Q(x) = be ^{ax}, b sin ax, b cos ax, bx^{k}, V e ^{ax}- Method of undetermined coefficients.

UNIT- IV

Method of variation of parameters - Linear differential equations with non constant coefficients - The Cauchy - Euler Equation - Legendre's Linear Equations - Miscellaneous Differential Equations. Partial Differential Equations: Formation and solution- Equations easily integrable - Linear equations of first order.

PRESCRIBED TEXT BOOK :

• Zafar Ahsan, Differential Equations and Their Applications

REFERENCE BOOKS:

. Frank Ayres Jr, Theory and Problems of Differential Equations.

• Ford, L.R, Differential Equations

• Daniel Murray, Differential Equations.

• S. Balachandra Rao, Differential Equations with Applications and Programs.
• Stuart P Hastings, J Bryce McLead; Classical Methods in Ordinary Differential Equations.