Regulation GRBT-20	**Godavari Institute of Engineering & Technology (Autonomous)**	I B.Tech. (II Semester)			
Course Code XXXXXXX	**MATHEMATICS - II** (ALL BRANCHES)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Fundamentals of differentiation and interation.		3	0	0	3

Course Objective:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Solve first order differential equations.
CO2:	Solve higher order differential equations with constant coefficients.
CO3:	Apply the knowledge of approximating and find the roots of polynomial and transcendental equation in practical engineering problems.
CO4:	Understand numerical differentiation and integration.
CO5:	Apply the Knowledge of different algorithms for approximating the solution of ordinary differential equations in practical Engineering problems.

Syllabus:

UNIT I: Mean value theorems, First Order differential equations & Applications **10 hrs**
Rolle's theorem, Lagrange's mean value theorem, Cauchy mean value theorem.
Formation of differential equation, Solutions of Exact and Reducible to exact, Linear and Bernoulli differential equations. Applications: Newton's law of cooling, Law of natural growth and decay, Orthogonal trajectories.

UNIT II: Higher Order Differential Equations and Applications **10 hrs**
Solutions of higher order differential equations with constant coefficients. Solutions of Non-homogeneous equations of higher order with constant coefficients with RHS term of the form $e^{ax}, sinax, cosax$, Polynomials in $x, e^{ax}V(x), xV(x)$. Method of variation of parameters. Applications: Mass spring system and L-C-R Circuit problems.

Unit III: Solutions of Algebraic, Transcendental Equations and Interpolation **8 hrs**
Introduction, Bisection method, Regula-Falsi method and Newton-Raphson method.
Interpolation: Newton's Forward and backward formulae, Lagrange's interpolation.

UNIT IV: Numerical Differentiation and Integration **10 hrs**
Numerical differentiation: Forward and backward difference formulae. Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rule.

UNIT V: Numerical Solution of Ordinary Differential Equations **10 hrs**
Solutions of ordinary differential equations- Taylor's series, Euler method, Modified Euler method, Runge-Kutta method (Second and fourth order) for first initial value problems.

Text books:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:
1. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. T.K.V.Iyenger, et.al., Engineering Mathematics, Volume-I, S.Chand Publicatiobns, 2016.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.

Web Links:
1. https://nptel.ac.in/courses/111108081/
2. https://nptel.ac.in/courses/111105093/
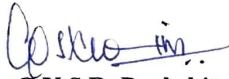
CO-PO Mapping:
(1: Slight [Low];   2: Moderate[Medium];   3: Substantial[High],   '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	-	-	-	1
CO2	3	3	3	2	-	-	-	-	-	-	-	1
CO3	3	3	3	2	-	-	-	-	-	-	-	1
CO4	3	3	3	2	-	-	-	-	-	-	-	1
CO5	3	3	2	2	-	-	-	-	-	-	-	1

Dr. V. Ravindranath,
Professor of Mathematics,
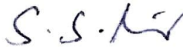OSD to Vice Chancellor
JNTUK,
Kakinada,
Andhra Pradesh, India.

Dr. G.V.S.R. Deekshitulu,
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SRKR Engineering College,
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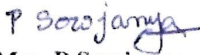Andhra Pradesh, India.

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