Maharaja Agrasen Institute of Technology

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Department of Electrical & Electronics Engineering

Computational Methods (ES201)

ACADEMIC PLAN FOR SEMESTER-III 2022

S.No.	TOPICS TO BE COVERED	Total No. of Lectures (42)	CO
	UNIT-I (Review and Location of roots of equation)		
1	Review of Taylor Series, Rolle 's Theorem and Mean Value Theorem	2	CO1
2	Approximations and Errors in numerical computations, Data representation and computer arithmetic, Loss of significance in computation	2	
3	Bisection method (convergence analysis and implementation), Newton Method (convergence analysis and implementation), Secant Method (convergence analysis and implementation).	2	
4	minimization by Fibonacci search	1	
5	Golden Section Search and Newton's method	1	
6	Multivariate function minimization by the method of steepest descent, Nelder- Mead Algorithm	2	
7	Assumptions for interpolation, errors in polynomial interpolation	1	
	UNIT-II (Interpolation and Numerical Integration)		
8	Finite differences	1	CO2
9	Gregory-Newton's Forward Interpolation, Gregory-Newton's backward Interpolation	1	
10	Lagrange's Interpolation	1	

11	Newton's divided difference interpolation	1	
12	Definite Integral, Newton-Cote's Quadrature formula	1	
13	Trapezoidal Rule	1	
14	Simpson's one-third rule, simpson's three-eight rule	2	
15	Errors in quadrature formulae	1	
16	Romberg's Algorithm	1	
17	Gaussian Quadrature formula	1	
After Mid Term			
UNIT-III(System of Linear Algebraic Equations)			
18	Existence of solution	1	CO3
19	Gauss elimination method and its computational effort, concept of Pivoting	2	
20	Gauss Jordan method and its computational effort	1	
21	Dolittle algorithm, Crout's Algorithm, Cholesky method	2	
22	Power method	1	
23	First-Degree and second degree Splines	2	
24	Natural Cubic Splines	1	
25	B Splines, Interpolation and Approximation	1	
UNIT-IV(Numerical Solution of Ordinary and Partial Differential Equations)			
26	Picard's method, Taylor series method	2	CO4
27	Euler's and Runge-Kutta's methods	2	
28	Euler's method (Modified/ Predictor-corrector methods)	2	
29	Adams-Bashforth method	1	
30	Milne's method	1	
31	Numerical Solution of Partial Differential equations: Parabolic equation	1	
32	Hyperbolic, and elliptic equations	2	

Course Objectives

C.201.1	Ability to develop mathematical models of lowlevelengineering problems
C.201.2	Ability toapplyinterpolation methods and numerical integration.
C.201.3	Ability to solve simultaneouslinearequationsand curve fitting by splines
C.201.4	Ability to numerically solve ordinary differential equations thatareinitialvalueorboundary value problems