SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

Department of Applied Mathematics	LP: MA18451
B.E/B.Tech: (Common to CE/CH/EE/ME/MR)	Rev. No: 0
Regulation: 2018	Date: 16/12/2019
Sub. Code / Sub. Name : MA18451 COMPUTATIONAL METHODS **Unit** : I	

Unit syllabus: Solution of Equations and Eigen value problems

Solution of algebraic and transcendental equations- Newton Raphson method -Solution of linear system by Gaussian elimination method and Gauss Jordan methods - Iterative methods of Gauss-Seidel method- Inverse of a matrix by Gauss Jordan method-Eigen value of a matrix by Power method.

Objective: To know how to Solve the given algebraic or transcendental equation and linear system of equations.

Session No	Topics to be covered	Ref	Teaching Method
1	Introduction of the syllabus and Unit I	TB -1&2	BB/PPT
2	Newton Raphson method and problems	Pg 38-44	BB/PPT
3	Newton Raphson method and problems	Pg 38-44	BB/PPT
4	Solution to linear system of equation Gauss elimination method	Pg 80-82	BB/PPT
5	Gauss Jordan method	Pg 83-85	BB/PPT
6	Gauss Seidal method problems	Pg 93-97	BB/PPT
7	Inverse of a matrix by Gauss Jordan method	Pg 106-108	BB/PPT
8	Eigen value problems – Power method	Pg 117-120	BB/PPT
9	Eigen value problems – Power method	Pg 117-120	BB/PPT
Content beyond syllabus covered (if any):			

*** Session duration: 50 minutes**

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Sub. Code / Sub. Name: MA18451 COMPUTATIONAL METHODS

Unit : II

Unit syllabus: Interpolation and Approximation

Interpolation with unequal intervals-Lagrange's Interpolation-Inverse Lagrange's interpolation method – Newton's divided difference interpolation – Interpolation with equal intervals -Newton's forward and back ward difference formulae.

Objective: To Know how to interpolate or extrapolate with the data available.

Session No	Topics to be covered	Ref	Teaching Method
10	Introduction of the syllabus and Unit II	TB.1 & Ref.4	BB/PPT
11	Lagrangian polynomial method	Ref 4 Pg 110-113	BB/PPT
12	Lagrangian method	Ref 4 Pg 110-113	BB/PPT
13	Inverse interpolation using Lagrangian method	Ref 4 Pg 110-113	BB/PPT
14	Divided differences method	Ref 4 Pg 113-118	BB/PPT
15	Divided differences methods and problems	Ref 4 Pg 113-118	BB/PPT
16	Newton's Forward differences method	TB 1 Pg 232-238	BB/PPT
17	Newton's backward differences method	TB 1 Pg 232-238	BB/PPT
18	CAT-I		
Content beyond syllabus covered (if any):			

*** Session duration: 50 minutes**

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Unit : III

Unit syllabus: Numerical Differentiation and Integration.
Approximation of derivatives using interpolation polynomials– Numerical integration by Trapezoidal, Simpson's 1/3 - Two and three point Gaussian quadrature formulae – Double integrals using Trapezoidal and Simpson's 1/3rules.

Objective: To acquire the knowledge of finding numerical values of differentiations and integrations.

Session No	Topics to be covered	Ref	Teaching Method
19	Introduction of the syllabus and Unit III	TB1 & Ref. 4	BB/PPT
20	Approximation of derivation using interpolation polynomial	TB 2 Pg 212-214	BB/PPT
21	Approximation of derivation using interpolation polynomial	TB 2 Pg 212-214	BB/PPT
22	Numerical Integration by Trapezoidal rule and problems	Ref. 4 Pg 156-159	BB/PPT
23	Simpson's 1/3 rule and problems	Ref. 4 Pg 156-159	BB/PPT
24	Two and three point Gaussian quadrature formulas and problems	TB 1 Pg 265-270	BB/PPT
25	Double integration by Trapezoidal method and Problems	Ref 4 Pg 161-163	BB/PPT
26	Double integration by Simpson's 1/3rules and Problems	Ref 4 Pg 161-163	BB/PPT
27	Tutorial Class		
Content beyond syllabus covered (if any):			

*** Session duration: 50 minutes**

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Unit : IV

Unit syllabus: Initial value problems for ODE.

Single step Methods – Taylor's series method- Modified Euler's Method – Fourth order Runge – Kutta method for solving first, second order and simultaneous first order equations – Multistep methods – Milne's and Adams-Bash forth Predicator and corrector methods for solving first order equations.

Objective: To know how to solve the given ODE, numerically.

Session No	Topics to be covered	Ref	Teaching Method
28	Introduction of the syllabus and Unit IV	Ref. 7	BB/PPT
29	Taylor's series method and Problems	Ref.7 Pg 352-362	BB/PPT
30	Modified Euler method and problems	Ref.7 Pg 371-376	BB/PPT
31	Fourth order Runge Kutta method for solving first order equations.	Ref.7 Pg 383-393	BB/PPT
32	Fourth order Runge Kutta method for solving second order equations	Ref.7 Pg 383-393	BB/PPT
33	Fourth order Runge Kutta method for solving simultaneous equations	Ref.7 Pg 383-393	BB/PPT
34	Multi step method -Miline's method and problems	Ref.7 Pg 395-404	BB/PPT
35	Adam's method and problems	Ref.7 Pg 404-408	BB/PPT
36	CAT-II		
Content beyond syllabus covered (if any):			

*** Session duration: 50 minutes**

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Unit : V

Unit syllabus: Boundary value problems in partial differential equations.
Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain-One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods-One dimensional wave equation by explicit method.

Objective: To know how to solve the boundary value problems numerically.

Session No	Topics to be covered	Ref	Teaching Method
37	Introduction of the syllabus and Unit V	TB 1 & Ref.7	BB/PPT
38	Two dimensional Laplace equation – problems	TB 1 Pg 351-356	BB/PPT
39	Two dimensional Laplace equation – problems	TB 1 Pg 351-356	BB/PPT
40	Two dimensional Poisson equation – problems	TB 1 Pg 356-360	BB/PPT
41	Two dimensional Poisson equation – problems	TB 1 Pg 356-360	BB/PPT
42	One dimensional heat flow equation by explicit method	Ref.7 Pg 441-446	BB/PPT
43	One dimensional heat flow equation by implicit(Crank-Nicholson)method	Ref.7 Pg 446-451	BB/PPT
44	One dimensional wave equation by explicit method	Ref.7 Pg 452-459	BB/PPT
45	CAT-III		
Content beyond syllabus covered (if any):			

*** Session duration: 50 minutes**

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TEXT BOOKS:

1. Grewal.B.S., and Grewal.J.S., Numerical methods in Engineering AND Science, Khanna Publishers,9th Edition, New Delhi,2007
2. Iyenger.S.R.K. and Jain.R.K, Numerical methods, New Age International Publishers, New Delhi, 2012.
3. William Embleton OBE and Leslie Jackson, Reed's Mathematics for Engineers, Adlard Coles Nautical, London, 2011.(for Marine Engineers)

REFERENCES:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 7thEdition, Wiley, India, 2007.
2. Chapra, S.C., and Canale,R.P., Numerical methods for Engineers, Tata McGraw Hill,5th Edition , New Delhi, 2007.
3. Brian Braide, A friendly introduction to Numerical Analysis, Pearson Education, Asia, New Delhi, 2007.
4. Sankara Rao, K, Numerical methods for Scientists and Engineers, Prentice Hall of India Private, 3rd edition, New Delhi, 2007.
5. Gerald, C.F., and Wheatley, P.O., Applied Numerical analysis, Pearson education, Asia, 6th edition, New Delhi, 2006.
6. Venkataraman, M.K., Numerical methods in Science and Engineering, National Publishers, 1995.
7. Kandasamy, K., Thilagavathy, K., and Gunavathy, K., Numerical Methods, S. Chand & Company Ltd., New Delhi, 2008.

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Remarks *:		

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