SANATAN DHARMA COLLEGE, AMBALA CANTT

College with Potential for Excellence, UGC, New Delhi
NAAC Accredited Grade "A+" with CGPA 3.51 in 3rd cycle
ISO 9001:2015 & ISO 14001:2015 Certified

Department of Computer Science

Lesson Plan (Session 2022-2023)

Class: BCA **Sem: I** **Sec-A & B Course Code: BCA-236**
Nomenclature: Computer Oriented Numerical Methods
Duration: 16 Weeks **Dates: 1 Sep, 2022- 24 Dec, 2022**

SYLLABUS

Maximum Marks: 100 **External: 80** **Minimum Pass Marks: 35**
Internal: 20 **Time: 3 hours**

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT-I

Computer Arithmetic: Floating-point representation of numbers, arithmetic operations with normalized floating-point numbers and their consequences, significant figures.
Error in number representation- inherent error, truncation, absolute, relative, percentage and round-off error.
Iterative Methods: Bisection, False position, Newton-Raphson method, Iteration method, discussion of convergence, Bairstow's method.

UNIT-II

Solution of simultaneous linear equations and ordinary differential equations: Gauss-Elimination methods, pivoting, Ill-conditioned equations, refinement of solution. Gauss-Seidal iterative method, Euler method, Euler modified method, Taylor-series method, Runge-Kutta methods, Predictor-Corrector methods.

UNIT-III

Interpolation and Approximation:
Polynomial interpolation: Newton, Lagranges, Difference tables, Approximation of functions by Taylor Series.
Chebyshev polynomial: First kind, Second kind and their relations, Orthogonal properties.

UNIT-IV

Numerical Differentiation and integration: Differentiation formulae based on polynomial fit, pitfalls in differentiation, Trapezoidal & Simpson Rules, Gaussian Quadrature.

REFERENCE BOOKS

1. V. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall, India.
2. S. S. Sastry, Introductory Methods of Numerical Analysis.
3. M. K. Jain, S.R.K. Iyengar & R. K. Jain, Numerical Methods for Scientific and Engineering Computation.
4. H. C. Saxena, Finite Differences and Numerical Analysis

Course Outcomes

After the completion of this course, prospective Computer professionals will have the ability to

CO-1	Understand and perform Computer Arithmetic: Floating-point representation of numbers, arithmetic operations with normalized floating-point numbers and theirconsequences, significant figures. Error in number representation-inherent error, truncation, absolute, relative, percentage and round-off error
CO-2	Understand and apply Iterative Methods
CO-3	Understand and explain Solution of simultaneous linear equations and ordinary differential equations
CO-4	Understand and apply Interpolation and Approximation
CO-5	Understand and explain Numerical Differentiation and integration

S.No	Instructional Technique	Assessment Methods(AM)
1	Chalk & Talk	**Assignments**
2	ICT tools	**Quiz**
3	Group discussions	**Group Discussions**
4	Industrial visit	**Oral Tests**
5	Case studies	**Sessional**
6	Small Projects	**Presentations**
7	Workshop	**Seminar**
8	Spoken Tutorials	**University Exams**
9	Flipped Class	
10.	**E-Resources**	

Week	Date	BCA(1st Sem)		Instructional Technique	Assessment Method
		Section-A	**Section-B**		
I	**01-09-2022**		Computer Arithmetic: Floating-point representation of numbers,	**1**	**1,2,3,4**
	02-09-2022		Computer Arithmetic: Floating-point representation of numbers,	**1**	**1,2,3,4**
	03-09-2022		Arithmetic operations with normalized floating-point numbers	**1**	**1**
	04-09-2022	**SUNDAY**	**SUNDAY**	**1**	**1,2,3,4**
II	**05-09-2022**	Computer Arithmetic: Floating-point representation of numbers,		**2-(PPT/Projector)**	**1,2,3,4**
	06-09-2022	Computer Arithmetic: Floating-point representation of numbers,		**2-(PPT/Projector)**	**1,2,3,4**
	07-09-2022	Arithmetic operations with normalized floating-point numbers		**2-(PPT/Projector)**	**1,2,3,4**
	08-09-2022		significant figures.	**1**	**1,2,3,4**
	09-09-2022		Error in number representation- inherent error, truncation, absolute, relative, percentage and round-off error.	**2-(PPT/Projector)**	**1,2,3,4**
	10-09-2022		Iterative Methods: Bisection method	**1**	**1,2,3,4**

	11-09-2022	**SUNDAY**	**SUNDAY**		
III	**12-09-2022**	Significant figures.		**2-(PPT/Projector)**	**1,2,3,4**
	13-09-2022	Error in number representation-inherent error, truncation, absolute, relative, percentage and round-off error.		**2-(PPT/Projector)**	**1,2,3,4**
	14-09-2022	Iterative Methods: Bisection method		**2-(PPT/Projector)**	**1,2,3,4**
	15-09-2022		False position	**2-(PPT/Projector)**	**1,2,3,4**
	16-09-2022		Newton-Raphson method,	**---**	**6**
	17-09-2022		Iteration method, discussion of convergence	**9**	**1,2,3,4,6**
	18-09-2022	**SUNDAY**	**SUNDAY**	**8,10,2**	**1,2,3,4,**
IV	**19-09-2022**	False position		**8,10,2**	**1,2,3,4,**
	20-09-2022	Newton-Raphson method		**1**	**6**
	21-09-2022	Iteration method, discussion of convergence		**6**	**1,2,3,4**
	22-09-2022		Bairstow's method	**1**	**6**
	23-09-2022	**HOLIDAY**	**HOLIDAY**		
	24-09-2022		Solution of simultaneous linear equations and ordinary differential equations: Gauss-Elimination methods	**2-(PPT/Projector)**	**1,2,3,4**
	25-09-2022	**SUNDAY**	**SUNDAY**		

V	**26-09-2022**	**HOLIDAY**	**HOLIDAY**		
	27-09-2022	Bairstow's method		**2-(PPT/Projector)**	**1,2,3,4**
	28-09-2022	Solution of simultaneous linear equations and ordinary differential equations: Gauss-Elimination methods		**2-(PPT/Projector)**	**1,2,3,4**
	29-09-2022		Pivoting	**2-(PPT/Projector)**	**1,2,3,4**
	30-09-2022		Ill-conditioned equations, refinement of solution	**2-(PPT/Projector)**	**1,2,3,4**
	01-10-2022		Gauss-Seidal iterative method	**6**	**1,2,3,4**
	02-10-2022	**SUNDAY**	**SUNDAY**		
VI	**03-10-2022**	Pivoting, Ill-conditioned equations, refinement of solution		**2-(PPT/Projector)**	**1,2,3,4**
	04-10-2022	Gauss-Seidal iterative method		**2-(PPT/Projector)**	**1,2,3,4**
	05-10-2022	**HOLIDAY**			
	06-10-2022		Euler method	**2-(PPT/Projector)**	**1,2,3,4**
	07-10-2022		Euler modified method	**1**	**1,2,3,4**
	08-10-2022		Interpolation and Approximation: Polynomial interpolation: Newton,	**2-(PPT/Projector)**	**1,2,3,4**
	09-10-2022			**9,10**	**1,2,3,4**
	10-10-2022	Euler method		**9,10**	**1,2,3,4**
	11-10-2022	Euler modified method		**2-**	**1,2,3,4**

				(PPT/Projector)	
VII	**12-10-2022**	Euler modified method		**2-(PPT/Projector)**	**1,2,3,4**
	13-10-2022		Lagranges	**6**	**1,2,3,4**
	14-10-2022		Taylor-series method	**1**	**1,2,3,4**
	15-10-2022		Taylor-series method	**2-(PPT/Projector)**	**1,2,3,4**
	16-10-2022	**SUNDAY**			
VIII	**17-10-2022**	Taylor-series method		**2-(PPT/Projector)**	**1,2,3,4**
	18-10-2022	Runge-Kutta methods		**1**	**1,2,3,4**
	19-10-2022	Class Test			**1,2,3,4**
	20-10-2022		Runge-Kutta methods	**2-(PPT/Projector)**	**1,2,3,4**
	21-10-2022		Revision	**6**	**1,2,3,4**
	22-10-2022		Runge-Kutta methods	**2-(PPT/Projector)**	**1,2,3,4**
	23-10-2022	**SUNDAY**			
IX	**24-10-2022**	**DIWALI BREAK**			
	25-10-2022	**DIWALI BREAK**			
	26-10-2022	**DIWALI BREAK**			
	27-10-2022		Class Test		
	28-10-2022		Predictor-Corrector methods	**1**	**1,2,3,4**
	29-10-2022		Predictor-Corrector methods	**1**	**1,2,3,4**
	30-10-2022	**SUNDAY**			
	31-10-2022	Revision		**2-(PPT/Projector)**	**1,2,3,4**
	01-11-2022	**HOLIDAY**			

X	**02-11-2022**	Predictor-Corrector methods		**2-(PPT/Projector)**	**1,2,3,4**
	03-11-2022		Revision		
	04-11-2022		Revision		
	05-11-2022		Revision		
	06-11-2022	**SUNDAY**			
XI	**07-11-2022**	Interpolation and Approximation: Polynomial interpolation: Newton		**1**	**1,2,3,4**
	08-11-2022	**HOLIDAY**			
	09-11-2022	Lagranges, Difference tables,		**1**	**1,2,3,4**
	10-11-2022		Interpolation and Approximation: Polynomial interpolation	**1**	**1,2,3,4**
	11-11-2022		Newton	**1**	**1,2,3,4**
	12-11-2022		Lagranges	**1**	**1,2,3,4**
	13-11-2022	**SUNDAY**			
XII	**14-11-2022**	Approximation of functions by Taylor Series.		**1**	**1,2,3,4**
	15-11-2022	Chebyshev polynomial: First kind, Second kind and their relations		**1**	**1,2,3,4**
	16-11-2022	Orthogonal properties		**2-(PPT/Projector)**	**1,2,3,4**
	17-11-2022		Difference tables,	**2-(PPT/Projector)**	**1,2,3,4**
	18-11-2022		Approximation of functions by Taylor Series.	**1**	**1,2,3,4**
	19-11-2022		Chebyshev polynomial: First kind, Second kind and their relations	**1**	**1,2,3,4**

	20-11-2022	**SUNDAY**			
XIII	**21-11-2022**	Assignment		**1**	**1,2,3,4**
	22-11-2022	Numerical Differentiation and integration		**1**	**1,2,3,4**
	23-11-2022	Revision			
	24-11-2022	**Sessional**	Orthogonal properties	**1**	**1,2,3,4**
	25-11-2022		Assignment		
	26-11-2022		Numerical Differentiation and integration	**1**	**1,2,3,4**
	27-11-2022	**SUNDAY**			
XIV	**28-11-2022**	Differentiation formulae based on polynomial fit		**1**	**1,2,3,4**
	29-11-2022	Pitfalls in differentiation, Trapezoidal & Simpson Rules		**1**	**1,2,3,4**
	30-11-2022	Gaussian Quadrature		**1**	**1,2,3,4**
	01-12-2022		**Sessional**		
	02-12-2022		Differentiation formulae based on polynomial fit	**1**	**1,2,3,4**
	03-12-2022		Pitfalls in differentiation, Trapezoidal & Simpson Rules	**1**	**1,2,3,4**
	04-12-2022	**SUNDAY**			
XV	**05-12-2022**	Revision			
	06-12-2022	Revision			
	07-12-2022	Revision			
	08-12-2022		Gaussian Quadrature	**1**	**1,2,3,4**
	09-12-2022		Revision		

	10-12-2022		Revision		
	11-12-2022	**SUNDAY**			
	12-12-2022	Revision			
	13-12-2022	Revision			
	14-12-2022	Revision			
XVI	**15-12-2022**		Question paper discussion		
	16-12-2022		Question paper discussion		
	17-12-2022		Question paper discussion		
	18-12-2022	**SUNDAY**			
	19-12-2022	Question paper discussion			
	20-12-2022	Question paper discussion			
XVII	**21-12-2022**	Question paper discussion			
	22-12-2022		Question paper discussion		
	23-12-2022		Question paper discussion		
	24-12-2022		Question paper discussion		

	Teacher Incharge	**Head of the Department**
Name	Arti Sachdeva	Dr. Girdhar Gopal
Sign with Date		