GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Master of Engineering

Branch: Textile Engineering

Course / Subject Code : ME01025071

Course / Subject Name : Computational Methods for Textiles

w. e. f. Academic Year:	2024-25
Semester:	1st Semester
Category of the Course:	PEC

Prerequisite:	**Basic engineering mathematics at BE level**
Rationale:	At the PG level students are required to develop various computational abilities. They also have to undergo research thesis. Knowledge of various computational tools and mathematics will help them in validating hypothesis firmly.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	To familiarize students with various computation methods used in textiles.
02	Apply the knowledge for understanding problems pertaining to textile processes.

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	1	0	4	70	30	0	0	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to Numerical Analysis: Analytic & Numerical solution, Sources of error (Inherent error, Truncation error, Round off error, Absolute error/ Relative error), Significant digits, Loss of significant digit. Solution to transcendental equations: Initial Approximation (Bisection method), Methods based on first degree approximation (Secant Method, Regula - Falsi Method, Newton - Raphson Method and its modifications), Rate of Convergence.	9	20
2.	System of linear algebraic equations and Eigenvalue problems: Direct Methods (Cramer's rule, Gauss – Elimination method [Pivoting], Gauss –	14	30

	Jordan Elimination method, LU Decomposition, Cholesky factorisation), Iteration Methods (Jacobi Iteration method, Gauss – Seidel method), Eigenvalues and Eigenvectors (Jacobi& Given's method for symmetric matrices, Power method, Inverse power method, Shift of Origin)		
3.	Interpolation: Arbitrary points (Lagrange Interpolation, Newton's Divided Difference), Equispaced points (Finite Differences, Newton Forward Difference, Newton Backward Difference).	8	20
4.	Ordinary differential equations: Euler Method, Taylor Series Method, Explicit Runge Kutta Method (second, fourth, higher order).	7	15
5.	Fundamentals of computer programming: Introduction, Flow charts, Pseudo Code Concepts: Structured Programming, Object Oriented Programming Programming in C++: Classes and Objects, Constructor sand Destructors, Operator Overloading, Inheritance, Pointers, Virtual Functions, Polymorphism.	7	15
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**20**	**20**	**20**	**20**	**10**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Fundamentals of Engineering Numerical Analysis, Parvin Moin, Cambridge University Press.
2. Object Oriented Programming in C++, Robert Lafore, 4th Edition, SAMS Publication.

(b) Open source software and website:

1. http://nptel.iitm.ac.in
2. World Wide Web, Google Search Engine etc.
3. Rahul Dubey, "An Introduction to Internet of Things: Connecting Devices, Edge Gateway, and Cloud with Applications", Cengage India Publication
4. Raj Kamal, "Internet of Things: Architecture and Design Principles, Mc Graw Hill Education Hanes et al "IoT Fundamentals", Cisco Press

5. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”, , Paperback, 2015.
6. A. McEwen, H. Cassimally, “Designing the Internet of Things”, Wiley, 2013. YashwantKanetkar, “21 Internet of Things Experiments”, Kindle edition
7. AdeelJaved, “Building Arduino projects for Internet of Things”, Apress publication
8. Donald Noris, “The Internet of Things: Do it yourself Projects with Arduino, Raspberry PI and
9. BeagleBone Black” Mc Graw Hill Publication
10. Adrian McEwen & Hakim Cassimally, “Designing the Internet of things”, Willey publication
11. Rahul Dubey, “An Introduction to Internet of Things: Connecting Devices, Edge Gateway, and Cloud with Applications”, Cengage India Publication Raj Kamal, “Internet of Things: Architecture and Design Principles, Mc Graw Hill Education
12. Hanes et al “IoT Fundamentals”, Cisco Press
13. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”, , Paperback, 2015.
14. A. McEwen, H. Cassimally, “Designing the Internet of Things”, Wiley, 2013.
15. YashwantKanetkar, “21 Internet of Things Experiments”, Kindle edition
16. AdeelJaved, “Building Arduino projects for Internet of Things”, Apress publication
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18. BeagleBone Black” Mc Graw Hill Publication
19. Adrian McEwen & Hakim Cassimally, “Designing the Internet of things”, Willey publication
20. Rahul Dubey, “An Introduction to Internet of Things: Connecting Devices, Edge Gateway, and Cloud with Applications”, Cengage India Publication

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