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MAHARASHTRA INSTITUTE OF TECHNOLOGY, AURANGABAD

**An Autonomous Institute Affiliated to
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad, Maharashtra (India)**

Second Year B. Tech. Syllabus
(Computer Science and Design)
2023-24
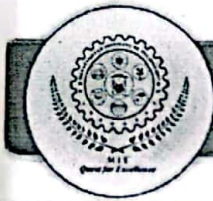
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S. Y. B. Tech. Syllabus Structure w.e.f. 2023-24 (Pattern 2021-22)

Computer Science and Design

Semester-III

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hr /Wk	Credits	MSE-I	MSE-II	CIE	TA	ESE/ Oral	Total
			Orientation Programs (2 Days)											
1.1	BSC	BSC204	Linear Algebra & Transform	3	1	-	4	4	15	15	10	10	50	100
1.2	PC	CSD201	Data Structure	3	-	-	3	3	15	15	10	10	50	100
1.3	PC	CSD202	Computer Graphics	3	-	-	3	3	15	15	10	10	50	100
1.4	PC	CSD203	Object Oriented Programming	3	-	-	3	3	15	15	10	10	50	100
1.5	PC	CSD204	Logic Design and Microprocessor	3	-	-	3	3	15	15	10	10	50	100
1.6	PC	CSD221	Lab-I: Data Structure	-	-	2	2	1	-	-	-	-	25	25
1.7	PC	CSD222	Lab-II: Computer Graphics	-	-	2	2	1	-	-	-	25	-	25
1.8	PC	CSD223	Lab-III: Object Oriented Programming	-	-	2	2	1	-	-	-	25	25	50
1.9	PC	CSD224	Lab-IV: Logic Design and Microprocessor	-	-	2	2	1	-	-	-	-	25	25
1.10	PC	CSD225	Lab-V: Data Analytics Lab	-	-	2	2	1	-	-	-	25	-	25
1.11	HSMC	HSM 804	Mandatory Non-Credit Course	2	-	-	2	-	Mandatory Non-Credit Course					
				17	1	10	28	21	75	75	50	125	325	650

Semester-IV

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hr /Wk	Credits	MSE-I	MSE-II	CIE	TA	ESE/Oral	Total
2.1	BSC	BSC251A/B	Complex Variable & Vector Calculus	3	1	-	4	4	15	15	10	10	50	100
2.2	PC	CSD251	Database Management System	3	-	-	3	3	15	15	10	10	50	100
2.3	PC	CSD252	Operating System	3	-	-	3	3	15	15	10	10	50	100
2.4	PC	CSD253	Discrete Mathematics and Graph Theory	3	-	-	3	3	15	15	10	10	50	100
2.5	PCC	CSD281 - CSD283	Professional Elective-I	3	-	-	3	3	15	15	10	10	50	100
2.6	PC	CSD271	Lab-I: Database Management System	-	-	2	2	1	-	-	-	-	25	25
2.7	PC	CSD272	Lab-II: Operating System	-	-	2	2	1	-	-	-	25	-	25
2.8	PC	CSD273	Lab-III: Web Programming	-	-	2	2	1	-	-	-	-	25	25
2.9	HSMC	HSM254	Lab-IV: Development of Skills (Soft Skills)	-	-	2	2	1	-	-	-	25	25	50
2.10	PC	CSD274	Lab-V: Problem-based learning	-	-	2	2	1	-	-	-	25	-	25
2.11	HSMC	HSM 805- HSM 807	Mandatory Non-Credit Course	2	-	-	2	-	Mandatory Non-Credit Course					
				17	1	10	28	21	75	75	50	125	325	650

L-Lecture, T- Tutorial, P- Practical, MSE- Mid Semester Exam, CIE- Continuous In-semester Evaluation, TA-Teacher Assessment, ESE- End Semester Examination
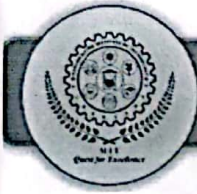
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Semster-III	Mandatory Non-Credit Course
HSM 804	Constitution of India

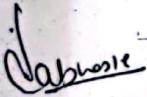| Semester-IV	Professional Elective-I
CSD281	Design Thinking
CSD282	Embedded System
CSD283	Human Computer Interaction

Semester-IV	Mandatory Non-Credit Course
HSM 805	Professional Ethics and Corporate Social Responsibility
HSM 806	Emotional Intelligence
HSM 807	Stress Management Through Yoga

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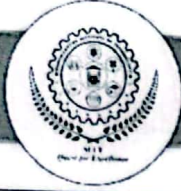Aurangabad.

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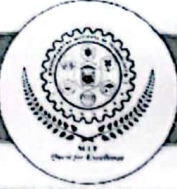
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<table>
<tr><td colspan="2" align="center">(Faculty of Science & Technology)
Syllabus of S. Y. B. Tech. (All branches) Semester-III</td></tr>
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Course Code: BSC204	Credits: 3-1-0
Course: Linear Algebra & Transform	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 3 Hrs./week	Continuous In-semester Evaluation: 10 Marks
Tutorial: 1 Hr/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs.

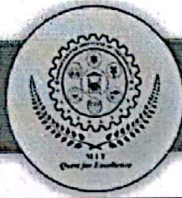|	
Prerequisite	Basic formulae of trigonometry, Derivative, Integration, Basic knowledge of Determinant and Matrices.
Course Objectives	1. To know the application of the matrix technique in finding find solution of system of linear equations that arises in many engineering problems. 2. To understand and solve higher order differential equations and apply them by mathematical modelling in various engineering problems. 3. To study and apply concept of transform.
Unit-I	**Complex Number** Introduction to complex number, De-Moivrer's theorem, root of complex number, circular function & hyperbolic function, relation between circular & hyperbolic function, inverse hyperbolic functions, separation of real & imaginary parts, Logarithm of complex quantity. **(7 Hrs.)**
Unit-II	**Matrix** Introduction to matrix, rank of matrix-echelon form, normal form, solution of simultaneous linear equations (homogeneous & non homogeneous). Eigen values and Eigen vectors, Cayley-Hamilton theorem. **(6 Hrs.)**
Unit-III	**Probability Distribution** Introduction, Probability distribution: Binomial distribution, Poisson distribution, Normal distribution. **(5 Hrs.)**

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Unit-IV	**Linear Differential Equation & Its Applications** Solution of nth order linear differential equation with constant coefficients: Complementary function, Particular integral- short method, method of variation of parameters, Application of Linear differential equation to electrical circuit, Civil and mechanical. **(6 Hrs.)**
Unit-V	**Laplace Transform** Definition, Laplace Transforms of elementary functions, Theorems and properties of Laplace transform (without proof): First shifting and second shifting theorem, Change of scale, Multiplication by t , Division by t, Laplace transform of Derivatives, Laplace transform of integral, Evaluation of integrals using Laplace transform, Laplace transform of Unit step function and Dirac's delta function. **(6 Hrs.)**
Unit-VI	**Inverse Laplace transform** Definition, Inverse Laplace transforms using: a) Some elementary functions b) Theorem and properties of Laplace transform c) Partial fraction method d) Convolution theorem. Application of Laplace transform to solve linear differential equations with given initial conditions. **(6 Hrs.)**

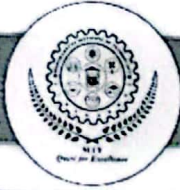|	Sr. No.	Title	Author	Publication	Edition
References	1.	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley eastern Ltd	10th
	2.	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill	1st
	3.	Advanced Engineering Mathematics	C.R. Wylie	McGraw Hill Publications	6th
	4.	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publications	43rd
	5.	Applied Mathematics	P. N. Wartika & J. N. Wartikar	Pune Vidyarthi Griha Pub	9th
	6.	A textbook of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications	Laxmi Publication

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	7.	Advanced Engineering Mathematics.	H.K.Dass	S.Chand And Co.Ltd	18th

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(Faculty of Science & Technology) Syllabus of S. Y. B. Tech. (CSD) Semester III	
Course Code: CSD201 Course: Data Structures Teaching Scheme: Theory: 3 Hrs. / week	Credits: 3-0-0
	Mid Semester Examination-I: 15 Marks
	Mid Semester Examination-II: 15 Marks
	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs.

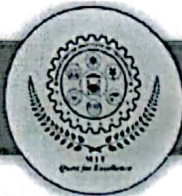| Prerequisite	'C' programming language for the implementation of data structures.
Objectives	1. To understand the concept of ADT and data structures. 2. To learn linear data structures- stack, queue, linked list. 3. To apply nonlinear data structures tree and graph for solving real-world problems. 4. To understand sorting, searching algorithms and hashing techniques.
Unit-I	**Introduction to Data Structures** Concept of Data and Information, Abstract Data types- basics, importance, Data Structures- Definition, classification, implementation aspects and memory representation, examples, applications. Introduction to linear data structure- Array and its operations. **(6 Hrs.)**
Unit-II	**Stacks and Queues** Stack- definition, terminology, memory representation, operations on stack- push, pop, peek, empty, full, implementation using arrays. Applications of stack- recursion, polish, and reverse-polish notations- conversion and evaluation. Queues- definition, terminology, memory representation, operations on queue, implementation using array, Types of queues and their applications. **(6 Hrs.)**

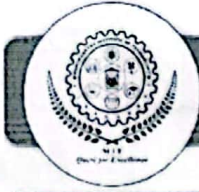|					
Unit-III	**Linked Representation** Concept of Dynamic Memory Allocation. Linked List- definition, memory representation, importance, types- singly linked list, doubly linked list, circular linked list, Operations on linked lists. Applications of linked list- polynomial manipulation. **(6 Hrs.)**				
Unit-IV	**Trees** Tree- Basic terminology. Binary tree- definition, types- complete, almost complete, strictly binary tree. Binary search tree- definition, operations- insertion, deletion, traversal- in-order, pre-order, post- order, level-order, search. Height Balanced Tree (AVL)-importance, rotations- left, right, left- right, right- left, constructing an AVL tree. Introduction to B tree, B+ tree, threaded binary tree. **(6 Hrs.)**				
Unit-V	**Graphs** Graphs- Basic terminology, representing graphs in memory. Graph Traversals- Breadth First Search, Depth First Search. Minimum Spanning Tree- definition, constructing minimum spanning tree- Kruskal's algorithm, Prim's Algorithm. **(6 Hrs.)**				
Unit-VI	**Sorting and Searching** Sorting: Bubble sort, selection sort, insertion sort, heap sort, radix sort, quick sort, merge sort. Searching: Linear search, binary search. Hashing- concept, examples, collision, resolving collision. **(6 Hrs.)**				
References	Sr. No.	Title	Author	Publication	Edition
	1	Data Structures using C and C++	Y Langsam , MJ Augenstein and A.M , Tanenbaum	Prentice Hall India	2nd 2015
	2	Data Structures Using C	Reema Thareja	Oxford University Press	2nd
	3	Data Structure and Algorithm Analysis in C	Mark Allen Weiss	Pearson Education	2nd
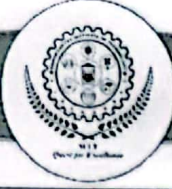
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	4	Data Structure and Program Design in C	R.L Kruse, B.P. Leung, C.L. Tondo,	Prentice-Hall India	2nd
	5	Data Structures, Algorithms and Object-Oriented Programming	Gregory L. Heilman	Tata McGraw-Hill	2nd

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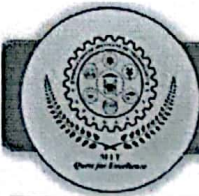MIT Aurangabad
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Syllabus of S. Y. B. Tech. (CSD) Semester III

Course Code: CSD202	Credits: 3-0-0
Course: Computer Graphics	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 3 Hrs. / week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs.

Prerequisite	No Prerequisites
Objectives	1. Use basic concepts of computer graphics. 2. Apply the transformation algorithms to the basic shapes. 3. Perform processing of basic shapes by various processing algorithms 4. Acquire knowledge about drawing basic shapes such as lines, circle ellipse, polygon.
Unit-I	**Introduction and Overview of Graphics Systems** Use of Computer graphics, Video Display Devices, Refresh Cathode-Ray Tubes, Raster and Random Scan Displays, Color CRT Monitors, Direct View Storage Tubes, Flat Panel Displays (6 Hrs.)
Unit-II	**Input output Devices** Three-Dimensional Viewing Devices, Stereoscopic &Virtual Reality Systems, Raster and Random Scan Systems, Different Input and Hard Copy Devices, Graphics Software. (6 Hrs.)
Unit-III	**2D Transformations** Introduction, Transformations (translation, rotation, scaling), matrix representation, rotation about an arbitrary point, homogeneous coordinates, composite transformations, reflection, and shearing. (6 Hrs.)
Unit-IV	**3D transformations** Windowing, Clipping: Window to view port transformations, 2D clipping,

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	Cohen-Sutherland line clipping algorithm, Introduction to polygon, inside-outside test, 3D Projections, Three dimensional object representation, Parallel and Perspective Polygons, Splines, Quadric Surfaces **(6 Hrs.)**
Unit-V	**Line, Circle and Character Generation** Basics concept in line Drawing, Line Drawing Algorithm, Digital Differential Analyzer, Bresenham's Line Algorithm, Antialiasing of Lines, Method of Antialiasing, Pixel Phasing, Representation of Circle, Polynomial Method, Trigonometric Method, Circle Drawing Algorithm, DDA Circle Drawing Algorithm, Bresenham's Circle Drawing Algorithm. **(6 Hrs.)**
Unit-VI	**Viewing** Classical three dimensional viewing, computer viewing, specifying views, parallel and perspective projective transformations . **Animation** Conventional and computer-based animation, Methods of Controlling Animations, Basic guidelines of animation, Animation languages, Multimedia File Formats. **(6 Hrs.)**

	Sr. No.	Title	Author	Publication	Edition
References	1	Computer Graphics with and OpenGL	Donald Hearn Pauline Baker	Prentice Hall, 2003	3rd
	2	Interactive Computer Graphics. A Top-Down, Approach Using OpenGL	Edward Angel	Education Pearson 2008	5th
	3	Computer Graphics	S. Harrington	McGraw-Hill Publications	2nd

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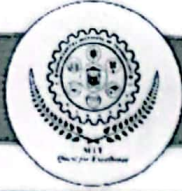## (An Autonomous Institute)

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Syllabus of S. Y. B. Tech. (CSD) Semester III

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Course Code: CSD203	Credits: 3-0-0
Course: Object Oriented Programming	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 3 Hrs. / week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs.

Prerequisite	Basics of Programming Languages.
Objectives	1. To understand Object Oriented Programming concepts 2. To understand the characteristics of Java, principles of packages, inheritance and interfaces. 3. To define exceptions and use I/O streams 4. To design and build simple Graphical User Interfaces
Unit-I	**Introduction to OOP and JAVA** Need of Object-Oriented Programming (OOP), Procedure Oriented Programming (POP) Versus Object Oriented Programming (OOP),Features of Object Oriented Paradigm, History of Java, Features of Java, Difference between Java, C and C++, Java Development Kit (JDK) (6 Hrs.)
Unit-II	**Java Programming Basics** Introduction to Java, Simple java program, Keywords& Identifiers, Data types, Variables, Operators, Input and Output in Java, Control structures including selection, Looping, Java methods, Math class, Strings and Arrays in java, Structure of Java Program (6 Hrs.)
Unit-III	**Classes and Objects** Defining Class, Field declaration, Method Declaration, Creating Objects, Accessing class Members, Constructors, Static Members, Access modifiers, this reference. (6 Hrs.)

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Unit-IV	**Inheritance, Interfaces and Packages** Inheritance in java, Super and sub class, Defining subclass, Multilevel and hierarchical Inheritance, Overriding methods, final keyword, abstract class and methods, visibility controls. Interface in java, defining Interfaces, extending and implementing interfaces. Packages: Defining packages, Class path variable, creation of package, importing packages **(6 Hrs.)**	
Unit-V	**Exception Handling and File Processing** Exception Handling: types of errors, Definition of an Exception; Exception handling basics, multiple catch statements, using finally, throwing exceptions. Input / Output files in Java: Streams Basics, stream classes, byte stream classes, character stream classes, using file class, creating files, Readers and Writers, Random Access Files. **(6 Hrs.)**	
Unit-VI	**Multithreading Programming and Applets** Introduction to multithreading, Thread Class, creating thread, stopping and blocking thread, life cycle of thread, using thread methods. What are Applets? applets and applications, creating applet, life Cycle of an Applet, designing webpage, applet tag, adding applet to html page, running an applet **(6 Hrs.)**	

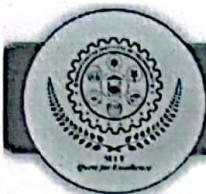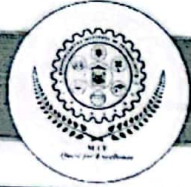|	Sr. No.	Title	Author	Publication	Edition
References	1.	Java: The Complete Reference	Herbert Schildt	McGraw Hill	11th
	2.	Programming with Java	E Balagurusamy	McGraw Hill	6th
	3.	Programming in Java	Sachin Malhotra Saurabh Chaudhary	Oxford University Press	2nd
	4.	Java 8 Programming: Black Book	Steven Holzner	Dreamtech Press	2nd

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	5.	Java : How to Program	H.M.Deitel,P.J. Deitel	Pearson Publication	10th

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Syllabus of S. Y. B. Tech. (CSD) Semester III

Course Code: CSD204	Credits: 3-1-0
Course: Logic Design & Microprocessors	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 3 Hrs./week	Continuous Internal Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs.

Prerequisites	Basic knowledge of mathematics, Basic Electronics Engineering.
Objectives	1 Learn digital logic design fundamentals, including coding, Boolean algebra, and logic gates. 2 Design and implement combinational and sequential logic circuits using Karnaugh maps. 3 Understand memory systems, including RAM, ROM, and cache memory organization. 4 Explore microprocessor architecture, instruction set, and memory hierarchy and its decoding techniques.
Unit-I	**Introduction to Digital Logic Design** Coding Techniques: ASCII code, Binary to Gray code converter, Boolean algebra and logic gates, Gray to Binary code converter, Karnaugh maps upto to 4- variable and simplification techniques. (6 Hrs.)
Unit-II	**Combinational and Sequential Logic Design** Combinational Logic Design: Full adder and full subtractor, Multiplexers and demultiplexers , Encoders and decoders. Sequential Logic Design: latches, Flip-flops S-R , J-K, T and D-type, Counters Ring counter, Johonson Counter, Synchronous and Asynchronous counter , Up and Down counters and shift registers (6 Hrs.)

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Unit-III	Programmable Logic Devices				
	Types of Memory ,RAM (Random Access Memory) and ROM (Read-Only Memory), ROM as a PLD, Memory organization and addressing techniques, Cache memory and its organization				**(6 Hrs.)**
Unit-IV	Introduction to Microprocessors 8086				
	Architecture and organization of microprocessors 8086, BIU , EU , Flag register, General purpose register , segment register, Instruction pointer , stack pointer, pointer and index register in EU, physical address calculation				**(6 Hrs.)**
Unit-V	Microprocessor Programming				
	Addressing modes , Assembly language program statement format , instruction formats , Instruction set , Assembly language programming. Programs for addition , subtraction, and data transfer.				**(6 Hrs.)**
Unit-VI	Microprocessor Interfacing				
	I/O mapped I/O and memory mapped I/O , 8086 memory banks ,address decoding techniques: Fully address decoding , partial decoding and block decoding, Interrupts and interrupt application				**(6 Hrs.)**

	Sr. No.	Title	Author	Publication	Edition
Textbooks / Reference Books	1.	Digital Logic and Computer Design	M. Marris Mano	PHI, New Delhi,	1st Ed., 2001
	2.	Modern Digital Electronics	R.P.Jain	Tata Mc-Graw hill	Fourth Edition
	3.	Digital Principles and Application	Malvino and Leach	TMH, New Delhi,	Digital Principles and Application
	4.	Digital Principles and Design	Donald Givone,	Tata Mc Graw Hill	4th Edition
	5.	Digital Logic Design	Morries Mano,	PHI	4th Edition 2009
	6.	Microprocessor Architecture,	Ramesh Gaonkar,	Penram International	Sixth Edition

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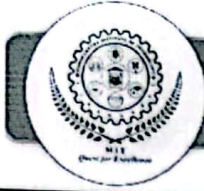Scanned with CamScanner
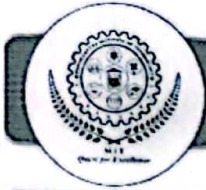
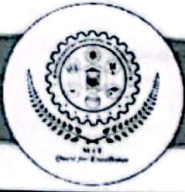|					
		Programming, and Applications with the 8085		Publication (India) Pvt. Ltd	
	7.	Microprocessors and Microcontrollers	B. Ram	Dhanpat Rai & Co.	Eighth Edition
	8.	8085 Microprocessor and Applications	Nagoor Kani	Flip cart Edition	Fourth Edition
	9.	Microprocessor 8085, Architecture, Programming, and Interfacing	Ajay Wadhava	PHI	2010 Edition

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Course Code: CSD221 Course: Lab-I Data Structures Teaching Scheme: Practical: 2 Hrs./week	Credits: 0-0-1 End Semester Examination / Oral: 25 Marks

Objectives	1. To implement the basic data structures- stack, queue, linked list. 2. To implement tree traversal techniques and operations on binary search tree. 3. To implement graph traversal techniques. 4. To implement sorting and searching algorithms.
List of Practical	1. Array based implementation of stack. 2. Array based implementation of queue. 3. Implementation of Singly linked list operations. 4. Implementation of doubly linked list operations. 5. Implementation of stack and queue using linked list. 6. Implementation of Binary tree traversals. 7. Implementation of operations on BST. 8. Implementation of BFS and DFS. 9. Implementation of Quick sort. 10. Implementation of linear and binary search.

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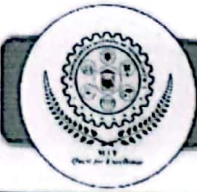MIT Aurangabad
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Syllabus of S. Y. B. Tech. (CSD) Semester III

Course Code: CSD222	Credits: 0-0-1
Course: Lab-II: Computer Graphics Teaching Scheme: Practical: 2 Hrs./week	Teachers Assessment: 25 Marks

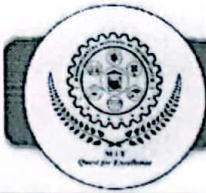| Objectives	To apply various search algorithms of artificial intelligence. To implement different algorithms of Artificial Intelligence.
List of Practical	1. Write a Program to draw basic graphics construction like line, circle, arc, ellipse, and rectangle. 2. Write a program to implement line clipping and point clipping. 3. Program to make screen saver in that display different size circles filled with different colors and at random places. 4. Write a program of Translation, Rotation, and Scaling using Composite Transformation. 5. Write a program to implement Boundary fill algorithm. 6. Write a program to create a rotating fan. 7. Write a program to draw a moving boat using graphics. 8. Write a Program control a ball using arrow keys. 9. Write a Program to implement Digital Clock. 10. Mini Project: Design and implement game / animation clip using open-source graphics library.

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Syllabus of S. Y. B. Tech. (CSD) Semester III

Course Code: CSD223	Credits: 0-0-1
Course: Lab-III: Object Oriented programming	Teachers Assessment: 25 Marks
Teaching Scheme:	End Semester Examination / Oral: 25 Marks
Practical: 2 Hrs./week	

|	
Objectives	1. To implement Object Oriented Programming concepts using Java. 2. To implement packages, inheritance and interfaces. 3. To handle exceptions and use I/O streams 4. To design and implement simple Graphical User Interfaces
List of Practical	1. Develop a program to declare a class called 'student' having data members name, roll no and percentage. Accept and display this data for a single object. 2. Write a program to insert an element (specific position) into an array. 3. Write a program that creates box Object and use constructor overloading and return result to calling method. 4. Write a program that implements multilevel inheritance 5. Write a program for implementing an interface. 6. Write a program to create a package. 7. Write a program to handle Arithmetic exception. 8. Write a program for creating, opening, closing, reading and writing a file. 9. Write a program to create multiple threads. 10. Write a program to create an applet.

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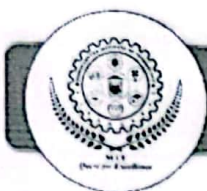|	
(Faculty of Science & Technology) Syllabus of S. Y. B. Tech. (CSD) Semester III	
Course Code: CSD224 Course: Lab-IV: Logic Design and Microprocessor Teaching Scheme: Practical: 2 Hrs./week	Credits: 0-0-1 End Semester Examination / Oral: 25 Marks
Objectives	1. To demonstrate the concept logic gates, design of combinational and sequential logic circuits 2. To use addressing modes & instruction set to implement programs for microprocessor and micro-controller
List of Practical	1. Implementation of Boolean expression using AND/OR/NOT logic. 2. Implementation of Boolean expression using NAND/NOR logic. 3. Realization of Half & Full Adder using logic gates. 4. Realization of Half & Full Sub-tractor using logic gates. 5. Design & Implement 8:1 Multiplexer using logic gates. 6. Design & Implement 1:8 De-multiplexer using logic gates. 7. Demonstrate the working of flip-flop. 8. Write an Assembly language program to print the string in 8086. 9. Write an Assembly language program for 8-bit & 16-bit addition in 8086. 10. Write an Assembly language program for 8-bit & 16-bit subtraction in 8086.

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Syllabus of S. Y. B. Tech. (CSD) Semester III

Course Code: CSD225	Credits: 0-0-1
Course: Lab-V Data Analytics Lab	Teachers Assessment: 25 Marks
Teaching Scheme:	
Practical: 2 Hrs./week	

|	
Objectives	1. Understand the R Programming Language.
	2. Exposure on visualizing data science problems.
	3. Understand the classification and Regression Model.
List of Practical	1. Introduction to R Programming and Study of basic Syntax in R
	2. R as a Calculator application
	a. Using with and without R objects on console
	b. Using mathematical functions on console
	c. Write an R script, to create R objects for calculator application and save in a specified location in disk.
	3. Descriptive Statistics In R
	a. Write an R script to find basic descriptive statistics using summary, str, quartile function
	b. Write an R script to find subset of dataset by using subset (), aggregate () functions on sample dataset
	4. Reading and Writing Different Types of Datasets
	a. Reading different types of data sets (.txt, .csv) from Web and disk and writing in file in specific disk location.
	b. Reading Excel data sheet in R.
	c. Reading XML dataset in R.
	5. Visualizations
	a. Find the data distributions using box and scatter plot.
	b. Find the outliers using plot.
	c. Plot the histogram, bar chart and pie chart on sample data
	Study and implementation of various control structures in R and calculate mean mode median for a dataset
	6. Correlation and Covariance
	a. Find the correlation matrix.
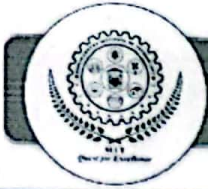
b. Find the outliers using plot.

c. Plot the correlation plot on dataset and visualize giving an overview of relationships among data.

7. Regression Model

Import a data from web storage. Name the dataset and now do Linear/Logistic Regression to find out relation between variables that are affecting the admission of a student in an institute based on his or her entrance score

8. Classification Model

a. Install relevant package for classification.

b. Choose classifier for classification problem.

c. Evaluate the performance of classifier.

9. Clustering Model

a. Clustering algorithms for unsupervised classification.

b. Plot the cluster data using R visualizations.

10. Mini Project

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Syllabus of S. Y. B. Tech. CSD (Semester III)

Course Code: HSM 804	Credit: 0-0-0
Course: Constitution of India	
(Non-credit Mandatory course)	
Teaching scheme:	
Theory: 2 Hrs./ week	

Prerequisite	Willingness to learn
Objectives	1. To create awareness about the constitution of India 2. To know different sections/articles of the constitution of India and their significance.
Unit-I	Meaning and Concept of Indian Constitution; Nature of Constitution; Brief Idea of Indian Constitution [Parts, Articles and Schedule] (02 Hrs.)
Unit-II	**Salient Features of Indian Constitution** Written and Enacted Constitution; The longest and most detailed Constitution of the World; Rigidity and Flexible Constitution; Parliamentary system of Government; Federal system with unitary bias; Adult Franchise; Single Citizenship; Sovereign, Democratic, Republic; Secularism; Directive Principles of State Policy; Independent Judiciary; Fundamental Rights; Fundamental Duties. (5 Hrs.)
Unit-III	**A. Fundamental Rights** Concept of State (Art. -12); Right to Equality (Art. -14 to 18); Right to Freedom (Art. -19 to 22); Right against Exploitation (Art. -23 & 24); Right to Religion (Art. -25 to 28); Right of Minorities (Art. -29 & 30); Constitutional Remedies (Art.-32). **Fundamental Duties (Art.-51 A)** (5 Hrs.)
Unit-IV	**Directive Principles of State Policy (DPSP's)** Meaning and Significance of Directive Principles; Classification/ Principles of
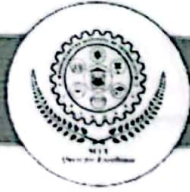
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	D.P.S.P.; Relationship between F.Rs. and D.P.S.P.	(04 Hrs.)

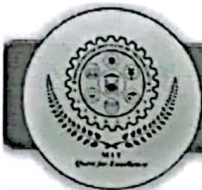|	
Unit-V	**Executives** **A) Union Government** The President, Council of Ministers, and Prime Minister. **B) State Government** The Governor, Council of Ministers and Chief Minister (04 Hrs.)
Unit-VI	**Election Commission:** Election Commission: Role and Functioning; Chief Election Commissioner and Election Commissioners; State Election Commission: Role and Functioning; Institute and Bodies for the welfare of SC/ST/OBC and women. (04 Hrs.)

	Sr. No.	Title	Author	Publication	Edition
References	1.	Constitution of India, Bare Act. Govt. of India	Constitution of India, Bare Act. Govt. of India	Constitution of India, Bare Act. Govt. of India	-
	2.	Our Constitution (AN Introduction of Indians Constitution and Constitutional tow,	Subhash C Kashyap	National Book Trust, India	2001
	3.	Indian Constitution,	Avasthi &, Maheshwarii	Lakshmi Narain Agrawal Agra.	2017
	4.	Introduction to the Constitution of India,	Basu D.D.,	Lexis Nexis,	2013
	5.	Indian Prime Minister	Sharma L.N.	the Macmillan Company of India,	1976
	6.	Union Executive,	Jain H.M.	Chaitanya Publishing House,	1969
	7.	Dr. B.R. Ambedkar, Framing of Indian Constitution (1 to 6 Volume)	Dr. S.N. Busi,	Ava Publishers	1st 2016
	8.	Indian Constitution Law,	M.P. Jain,	Nexis	7th 2014
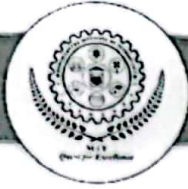
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9.	Outlines of Indian Legal and Constitutional History,	M.P. Jain,	Lexis Nexis,	2014

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Syllabus of S. Y. B. Tech. (Circuit Branches) Semester-IV	

Course Code:BSC251A/B	Credits: 3-1-0
Course: Complex variable & Vector Calculus	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 3 Hrs./week	Continuous In-semester Evaluation: 10 Marks
Tutorial: 1Hr/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs.

Prerequisites	Basic formulae of trigonometry, Derivative, Integration, algebra of complex numbers, fundamentals of vector algebra.
Course Objectives	1. To develop the mathematical skills of the students related to function of complex variables. 2. To make the students familiarize with concept of vector differentiation and vector integration. 3. To apply mathematical concepts for solving the practical problems in engineering and technology.
Unit-I	**Function of Complex Variable** Introduction , Analytic function ,Cauchy-Riemann equation in Cartesian and polar coordinates ,Harmonic function, orthogonal system , Integration in complex plane: Line integral, Contour integral, Cauchy's integral theorem, Cauchy's integral formula, Extension of Cauchy's theorem on multiply connected region, Singularities, Residues, Cauchy's residue theorem. (7 Hrs.)
Unit-II	**Fourier Series** Definition, Dirichlet's conditions; Fourier series for function having period 2L; Fourier series for even and odd function, half range expansion; Fourier sine and cosine series. (6 Hrs.)

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Unit-III	**Fourier Transform** Fourier integral theorem (without proof), Fourier sine and cosine integral, Fourier sine and cosine transform, inverse Fourier transform, inverse Fourier sine and cosine transform. **(5 Hrs.)**				
Unit-IV	**Vector Differentiation** Differentiation of vectors, Scalar and Vector point functions, Gradient of a scalar point function, Directional derivative, Divergence and Curl of vector point function, Irrotational and Solenoidal vector fields. **(6 Hrs.)**				
Unit-V	**Vector Integration** Line integral, Work done by a force, Surface integral, Green's theorem, Stokes's theorem. **(6 Hrs.)**				
Unit-VI	**Z – Transform** Definition, Z-transform of elementary function, properties of Z-transform (without proof), Inverse Z transform: Partial fraction method, inversion integral method (Residue method), Solution of Difference equation by using Z-transform. **(6 Hrs.)**				

References	Sr. No.	Title	Author	Publication	Edition
	1	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley eastern Ltd	10th
	2	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill	1st
	3	Advanced Engineering Mathematics	C.R. Wylie	McGraw Hill Publications	6th
	4	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publications	43rd
	5	Applied Mathematics	P. N. Wartika& J. N. Wartikar	Pune Vidyarthi Griha Prakashan,Pune	9th
	6	A text book of Engineering	N.P. Bali and Manish Goyal	Laxmi Publications	Laxmi Publica

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		Mathematics			tions
	7	Advanced Engineering Mathematics.	H.K.Dass	S.Chand And Co.Ltd	18th

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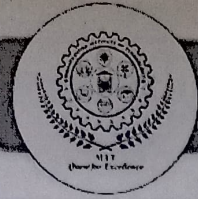| (Faculty of Science & Technology)	
Syllabus of Second year B.Tech (CSD) Semester-IV	
Course Code: CSD251 Course: Database Management System Teaching Scheme: Theory: 3 Hrs./week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Continuous In-semester Evaluation: 10 Marks Teacher Assessment: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 2 Hrs.
Prerequisite	Knowledge of programming language.
Objectives	1. Understand database concepts, applications, data models, schemas, and instances. 2. Use of SQL in querying the database 3. Learn the new emerging Technologies and Applications in database.
Unit-I	**Introduction** Database, Management Systems, Comparison with File Systems, Actors on the scene, Workers behind the scene, Advantages of using the DBMS Approach, A Brief History of Database Applications, When Not to use a DBMS Database System Concepts and Architecture - Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client /Server Architectures for DBMSs.　(6 Hrs.)
Unit-II	**Data Modelling** The importance of data models, Basic building blocks, Using High-Level Conceptual Data Models for Database Design, An example Database Application, Entity Types, Entity Sets, attributes and keys, Relation Types, Relationship Sets, roles and structural constraints, Weak Entity Types, Refining the ER Design for the Company Database, ER Diagrams, naming, conventions and design issues, Relationship Types of Degree Higher Than Two. (6 Hrs.)
Unit-III	**Relational Database Design** Normalization, Need of Normalization, Functional Dependencies, Normal forms 1NF, 2NF, 3NF, BCNF, multi valued functional dependency and 4NF　(6 Hrs.)

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Unit-IV	**Structures Query Language** Introduction, SQL Data Types and Literals, DDL, DML, DCL, TCL. SQL Operators, Tables: Creating, Modifying, Deleting. Views: Creating, Dropping, Updating using Views. Indexes. SQL DML Queries: SELECT Query and clauses, Set Operations, Joins, Tuple Variables, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update and Delete Queries. **(6 Hrs.)**
Unit-V	**Non-Relational Database Management System** NOSQL Systems-Introduction to NoSQL, Disadvantages of NoSQL technology, NOSQL Systems, weakness of RDBMS, CAP theorem, Types of NoSQL Databases, Key-value database-Key values database, More elements of key values database. **(6 Hrs.)**
Unit-VI	**Columnar & Document Databases** Columnar Databases with Apache Cassandra- Characteristics of a columnar database. Concepts of columnar databases, Cassandra Introduction and its use-cases. Introduction to Document databases, Document databases with MongoDB - Implement a document database with MongoDB **(6 Hrs.)**

	Sr. No.	Title	Author	Publication	Edition
References	1.	Fundamentals of Database Systems	Ramez Elmasri, Shamkan B. Navathe,	Pearson Education, ISBN-9788131792476	6th
	2.	Database System Concepts	Silberschatz A., Korth H., Sudarshan S.	McGraw Hill Publishers, ISBN 0- 07-120413-X	6th
	3.	Database Systems	Connally T, Begg C.	Pearson Education, ISBN 81-7808-861-4	4th
	4.	SQL Complete Reference	Paul N. Weinberg and Andy Oppel	McGraw Hill Publishers, ISBN: 9781259003882	3rd

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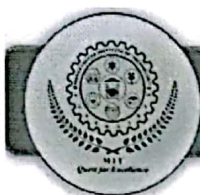
Syllabus of S. Y. B. Tech. (CSD) Semester IV

Course Code: CSD252	Credits: 3-0-0
Course: Operating System	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 3 Hrs. / week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs.

Prerequisite	Students must have a working knowledge of fundamental data structures and associated algorithms.
Objectives	1. To introduce basic concepts and functions of different operating systems. 2. To understand the concept of process, thread and resource management. 3. To understand the concepts of process synchronization and deadlock. 4. To understand various Memory, I/O and File management techniques.
Unit-I	**Introduction to Operating System** Operating System Objectives and Functions, Evolution of operating system, OS Design Considerations for Multiprocessor architectures, Operating System structures, System Calls **(6 Hrs.)**
Unit-II	**Process Management** **Process**: Concept of a Process, Process States, Process Description, Process Control Block, Operations on Processes. **Threads**: Definition and Types, Concept of Multithreading, Multi core processors and threads. **Scheduling**: Types of Scheduling: Preemptive and, Non-preemptive, Scheduling Algorithms and their performance evaluation: FCFS, SJF, SRTN, Priority based, Round Robin, Introduction to Thread Scheduling **(6 Hrs.)**
Unit-III	**Process Synchronization and Deadlocks** **Concurrency**: Principles of Concurrency, Inter-Process Communication, Process/Thread Synchronization. **Mutual Exclusion**: Requirements, Hardware and

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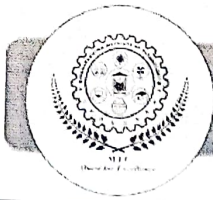
	Software Support, Semaphores and Mutex, Monitors, Classical synchronization problems: Readers/Writers Problem, Producer and Consumer problem. **Principles of Deadlock**: Conditions and Resource Allocation Graphs, Deadlock Prevention, **Deadlock Avoidance**: Banker's Algorithm for Single & Multiple Resources, Deadlock Detection and Recovery. Dining Philosophers Problem. **(6 Hrs.)**	

Unit-IV	**Memory Management** Memory Management Requirements, Memory Partitioning: Fixed Partitioning, Dynamic Partitioning, **Memory Allocation Strategies**: Best-Fit, First Fit, Worst Fit, Next Fit, Relocation, Paging, Segmentation. **Virtual Memory**: Demand Paging, Structure of Page Tables, **Page Replacement Strategies**: FIFO, Optimal, LRU, LFU, Thrashing. **(6 Hrs.)**

Unit-V	**File System and I/O Management** **File Management**: Overview, File Organization and Access, Secondary Storage Management: File Allocation Methods, **I/O Management and Disk Scheduling**: I/O Devices, I/O Buffering, Disk Scheduling algorithm: FCFS, SSTF, SCAN, CSCAN, LOOK, C-LOOK. RAID **(6 Hrs.)**

Unit-VI	**Case Studies** XV6 OS, Distributed OS, Real Time OS, Mobile OS **(6 Hrs.)**

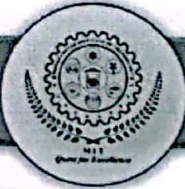|	Sr. No.	Title	Author	Publication	Edition
References	1	Operating System: Internals and Design Principles	William Stallings	Prentice Hall	8th
	2	Operating System Concepts	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne	John Wiley & Sons	9th
	3	Operating System Design and Implementation	Andrew S Tanenbaum	Pearson Education	3rd

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Syllabus of S. Y. B. Tech. (CSD) Semester IV

Course Code: CSD253	Credits: 3-0-0
Course: Discrete Mathematics& Graph Theory	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 3 Hrs./week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs.

Prerequisite	Basic Mathematics.
Objectives	1. To understand Discrete Mathematical Structures (DMS) and graph theory for the development of theoretical computer science, problem solving in programming language using Discrete Structure 2. To understand the importance of discrete structures towards simulation of a problem in computer science and engineering
Unit-I	**Logic and proofs** Discrete Mathematics, Significance of Discrete Mathematics in Computer Engineering. Propositional Logic, Application of Propositional Logic, Logical Connectives, Propositional Equivalences, Predicates and Quantifiers, Proof Methods and Strategy, Mathematical Induction. **(6 Hrs.)**
Unit-II	**Sets** Sets, Subsets, Venn Diagrams, Set Operations, Cardinality of Sets, Finite and Infinite Sets, Uncountable Infinite Sets, Principle of Inclusion and Exclusion. **(6 Hrs.)**
Unit-III	**Relations and Functions** Relations – Definition, Properties of binary relations, N-ary Relations and their Applications, Representing Relations , Closures of Relations, Equivalence Relations, Partial Orderings, partitions, Hasse Diagram, Lattices, Chains and Anti-Chains, Recurrence relations.
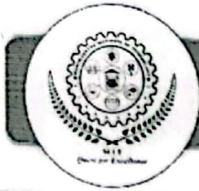
	Functions- Surjective, Injective and Bijective functions, Inverse Functions and Compositions of Functions, The Pigeonhole Principle. (6 Hrs.)				
Unit-IV	**Counting** The Basics of Counting, rule of sum and product, Permutations, Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Algorithms for generating Permutations and Combinations. (6 Hrs.)				
Unit-V	**Graphs** Basic terminology, multi graphs and weighted graphs, Representation of graph, Operations on Graphs, Hamiltonian and Eulerian paths and circuits, Shortest path-Dijkstra's algorithm, Traveling salesman problem, Factors of a graph, Planer graphs, Graph Coloring. Trees: Introduction, Basic Terminology. (6 Hrs.)				
Unit-VI	**Algebraic Structures** The Structure of Algebras, Semigroups, Monoids and Groups, Homomorphism and Normal Subgroups, Rings, Integral Domains and Fields, Polynomial Rings and Polynomial Codes. (6 Hrs.)				

	Sr. No.	Title	Author	Publication	Edition
References	1	Elements of Discrete Mathematics	C.L. Liu	Tata McGraw-Hill	3rd
	2	Discrete Mathematics and its Application	Kenneth H. Rosen	Tata McGraw-Hill	7th
	3	Discrete Mathematics with Applications	Susanna S. Epp.	Cengage Learning	4th
	4	Discrete Mathematics	R. Johnsonbaugh	Pearson Education	8th
	5	Discrete Mathematics with Graph Theory	E. Goodaire, M. Parmenter	Pearson Education	3rd

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Syllabus of S. Y. B. Tech. (CSD) Semester IV

Course Code: CSD281	Credits: 3-0-0
Course: Design Thinking	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 3 Hrs. / week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration):2 Hrs.

Prerequisite	NIL
Objectives	1. To learn design thinking concepts and principles 2. To learn the different phases of design thinking
Unit-I	**Introduction** Introduction to Design Thinking, Design Thinking as a problem solving tool, Principles of Design Thinking, Process of Design Thinking, Tools and techniques for Design Thinking process, Planning a Design Thinking project. **(6 Hrs.)**
Unit-II	**Empathize and Define** Search field determination, Problem clarification, understanding of the problem, Problem analysis, Reformulation of the problem, Observation Phase, Empathetic design, Tips for observing, Methods for Empathetic Design, Artifact Analysis, Behavioral Mapping and Tracking, Empathy Map, Cognitive Walkthrough, Heuristic Evaluation, Point-of-View Phase, Characterization of the target group, Description of customer needs, Persona, Define- Analysis and Drawing Inferences from Research. **(6 Hrs.)**
Unit-III	**Idea Generation** Idea generation Basic design directions, Themes of thinking, Inspiration and references, Brainstorming, Value, Inclusion, Sketching, presenting ideas Refinement Thinking in images, thinking in signs, Appropriation, Humour, Personification, Visual metaphors, Modification, thinking in words, Words and

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	language, Type 'faces', thinking in shapes, thinking in proportions, Thinking in colours, Ideation tools & exercises. Storytelling and Tools for Innovation Evaluation of ideas. **(6 Hrs.)**				
Unit-IV	**Prototype** Prototype Phase - Lean Startup Method for Prototype Development, Visualization and presentation techniques, Ideas to presentable concepts, Storyboards, Developing mock-ups, models and prototypes, Quick and Dirty Prototyping. **(6 Hrs.)**				
Unit-V	**Testing and Implementation** Test Phase – Technique for interviews and surveys, Kano Model, Desirability Testing, Presenting Prototypes, testing prototypes, obtaining feedback to refine product Usability and Ergonomic testing. **(6 Hrs.)**				
Unit-VI	**Design Thinking and Innovation** Design and Innovation as an Organizational Strategy: Design Thinking meets the corporation, Design Thinking a systematic approach to innovation, using design thinking to manage an innovation portfolio, Transforming Organization, The New Social Contract, Design Activism, Designing tomorrow. **(6 Hrs.)**				

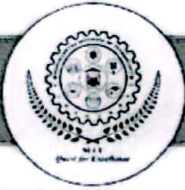|	Sr. No.	Title	Author	Publication	Edition
References	1	"Design Thinking"	Gavin Ambrose, Paul Harris	AVA Publishing	
	2	"Handbook of Design Thinking - Tips & Tools for how to design thinking"	Christian Mueller-Rotenberg		
	3	"Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation"	TimBrown		

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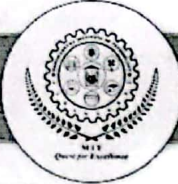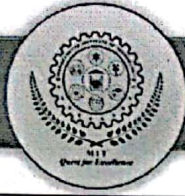# Maharashtra Institute of Technology, Aurangabad
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<table>
<tr><td colspan="2">(Faculty of Science & Technology)
Syllabus of S. Y. B. Tech. (CSD) Semester IV</td></tr>
<tr>
<td>Course Code: CSD282
Course: Professional Elective-I
Embedded System
Teaching Scheme:
Theory: 3 Hrs./week
Tutorial: 1Hr/week</td>
<td>Credits: 3-1-0
Mid Semester Examination-I: 15 Marks
Mid Semester Examination-II: 15 Marks
Continuous Internal Evaluation: 10 Marks
Teacher Assessment: 10 Marks
End Semester Examination: 50 Marks
End Semester Examination (Duration): 2 Hrs.</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>Basic knowledge of digital electronics and systems, microprocessor, and programming concepts.</td>
</tr>
<tr>
<td>Objectives</td>
<td>1 Learn the hardware and software in the unified way.
2 Understand Architecture and system development of Embedded systems.
3 Gain knowledge about different peripherals and their interfacing with Embedded system.
4 Understand the important concepts of real time operating systems.</td>
</tr>
<tr>
<td>Unit-I</td>
<td>Introduction to Embedded system
Embedded system overview deign challenge , processor technology , IC technology , design technology , trade off application areas categories of Embedded systems , overview of Embedded system architecture , Specialties of Embedded system, Recent Trends in Embedded systems   (7 Hrs.)</td>
</tr>
<tr>
<td>Unit-II</td>
<td>Architecture of Embedded systems
Hardware architecture , software architecture , application software , communication software . process of generating executable image, development/ Testing tools.   (6 Hrs.)</td>
</tr>
<tr>
<td>Unit-III</td>
<td>The process of Embedded System Development
The development process , requirements Engineering , design implementation , integration and testing , packaging , configuration management   (5 Hrs.)</td>
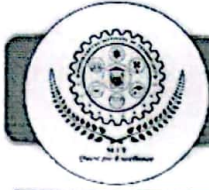</tr>
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Unit-IV	**Standard Single -Purpose Processors Peripherals** Timers , Counters, and watch dog timers, UART, PWM, LCD controller , ADC converter and real time clocks. **(6 Hrs.)**				
Unit-V	**Interfacing** Communication basics and terminology, Basics protocol concepts , ISA bus protocol, arbitration , multilevel bus architecture , parallel communication , serial communication , wireless communication , serial protocols, parallel protocols, and wireless protocols. **(6 Hrs.)**				
Unit-VI	**Real Time Operating Systems** Architecture of the kernel , tasks, and task scheduler interrupt service routine semaphores, mutex, mailboxes , message ques , event registers, pipes , signals , timers , memory management , priority inversion problem, OS security issues **(6 Hrs.)**				

	Sr. No.	**Title**	**Author**	**Publication**	**Edition**
Textbooks / Reference Books	1.	Embedded system Design A Unified Hardware/ Software Introduction	Frank Vahid/ Tony Givargis	Wiley India (P) Ltd	Third Edition
	2.	Embedded Systems Architecture, Programming and Design	Raj Kamal	Tata Mc-Graw hill	Second Edition
	3.	Embedded Real Time Systems: Concept Design and Programming Black Book	Dr.K.V.K.K. Prasad	Dreamtech Press	Reprint Edition 2013
	4.	Embedded Microcomputer Systems Real Time Interfacing	Jonathan W. Valvano	Thomson Learning	First Edition

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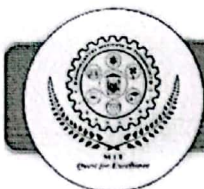
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Syllabus of S. Y. B. Tech. (CSD) Semester IV

</div>

Course Code: CSD283	Credits: 3-0-0
Course: Human Computer Interaction	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 3 Hrs. / week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs.

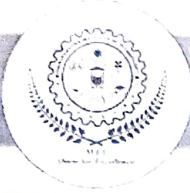| Prerequisite	Fundamentals of programming, computer interfaces, interface design
Objectives	1. To introduce fundamental concepts of human computer interaction. 2. To understand the importance design, users and their interaction with computers 3. To become familiar with the design technologies for individuals and persons with disabilitie s. 4. To understand design principles, models and evaluation techniques in user interface design.
Unit-I	**Introduction to HCI** What is HCI, Discipline involved in HCI, Why HCI is Important, Psychology of Everyday Things, Principles of HCI, User centered design (6 Hrs.)
Unit-II	**Understanding the Human:** Input-Output channel, Human Memory, Thinking Reasoning and problem solving, Human Emotions, Individual differences, Psychology and the design of interactive systems (6 Hrs.)
Unit-III	**The Interaction in HCI** Models of Interaction, Ergonomics, Interaction Styles, WIMP, Interactivity, The context of interaction (6 Hrs.)
Unit-IV	**Design Process:** What is Interaction design, The software design process, User focus, Scenarios,

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	Navigation design, Screen Design, Prototyping techniques			(6 Hrs.)

Unit-V	**Design rules, Guidelines and Evaluation Techniques** Principles that support usability, Design standards, Design guidelines, Golden rules and heuristics, Using toolkits, User interface management system UIMS (6 Hrs.)

Unit-VI	**Models and Theories** HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models-Hypertext, Multimedia and finding things on web Future of HCI (6 Hrs.)

	Sr. No.	Title	Author	Publication	Edition
References	1	"Human Computer Interaction"	Alan Dix, Janet Finlay	Pearson Education	2004,3rd
	2	"Designing the User Interface - Strategies for Effective Human Computer Interaction"	Ben Shneiderman	Pearson Education	2010, 5th
	3	"Interaction Design: beyond Human Computer Interaction"	Helen Sharp, Rogers, Preece	Wiley publications	3rd

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Syllabus of S. Y. B. Tech. (CSD) Semester IV	
Course Code: CSD271	Credits: 0-0-1
Course: Lab-I: Database Management System	End Semester Examination / Oral: 25 Marks
Teaching Scheme:	
Practical: 3 Hrs./week	

Prerequisite	Knowledge of programming language.
Objectives	1. Creation of Database, tables using DDL, DML SQL commands. 2. Applying keys and constraints on tables. 3. Retrieving data using wild cards and pattern matching. 4. Perform various data manipulation commands, aggregate functions and sorting techniques. 5. Apply the concept of Aggregating Data using group by and having clause. 6. Use of set operators to combine the result of multiple queries. 7. Solve queries using the concept of sub query. 8. Displaying data from multiple tables using Joins. 9. Implementation of Views. 10. Implementation of Stored Procedure. 11. Apply the concept of security and privileges.
Software	• Any ERD Design Tool (like dbdiagram.io.,draw.io.,Lucidchart. • Any SQL interface (like Oracle, MySQL, Postgres., etc).

	Sr. No.	Title	Author	Publication	Edition
References	1	SQL, PL/SQL the Programming Language of Oracle	Ivan Bayross	BPB Publications	4th
	2	Learning SQL: Master SQL Fundamentals	Alan Beaulieu	O'reilly	2nd

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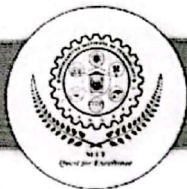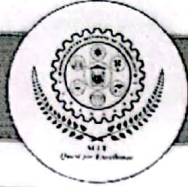| (Faculty of Science & Technology)	
Syllabus of S. Y. B. Tech. (CSD) Semester IV	
Course Code: CSD272	Credits: 0-0-1
Course: Lab-II: Operating System	Teacher Assessment: 25 Marks
Teaching Scheme:	
Practical: 2 Hrs./week	
Objectives	1. To provide an understanding of the design aspects of operating system concepts

List of Practical	1. Explore the internal commands of linux and Write shell scripts to do the following:
	     a. Display top 10 processes in descending order
	     b. Display processes with highest memory usage
	     c. Display current logged in user and logname
	     d. Display current shell, home directory, operating system type, current path setting, current working directory
	     e. Display OS version, release number, kernel version
	 2. Illustrate the use of sort, grep, awk.
	 3. System calls for file manipulation
	 4. Building multi-threaded and multi-process applications
	 5. CPU scheduling algorithms like FCFS, SJF, Round Robin etc.
	 6. Process and Thread Synchronization using client server mechanism
	 7. Implement order scheduling in supply chain using Banker's Algorithm
	 8. Using the CPU-OS simulator analyze and synthesize the following:
	     a. Process Scheduling algorithms.
	     b. Thread creation and synchronization.
	     c. Deadlock prevention and avoidance.
	 9. Implement various page replacement policies
	 10. Implement disk scheduling algorithm FCFS, SSTF, SCAN, CSCAN etc.

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Syllabus of S. Y. B. Tech. (CSD) Semester IV

Course Code: CSD273	Credits: 0-0-1
Course: Lab-III: Web Development	End Semester Examination / Oral: 25
Teaching Scheme:	Marks
Practical: 2 Hrs./week	

Objectives	1. Programming skills in Html5, CSS3, Bootstrap 4.
	2. Developing skills of Web Applications user interactions using JavaScript, PHP
	3. Web application Development Database with React and React Native.

List of Practical	**1. HTML LAYOUTS AND LINKS**
	• Develop a web application to control over different layouts.
	• Create a webpage with HTML describing your department use paragraph and list tags.
	• Apply various colors to suitable distinguish key words, also apply font styling like italics, underline and two other fonts to words you find appropriate, also use header tags.
	• Create links on the words e.g. "Wi-Fi" and "LAN" to link them to Wikipedia pages.
	2. WEB APLLICATION DESIGN FORMTTING
	• Develop a web application with background banner image and navigation menus.
	• Develop a web application with responsive images.
	• Develop a web application using left menu.
	• Develop setting to change the theme of entire web Application.
	3. INTRODUCTION TO RESPONSIVE INTERFACE USING BOOTSRAP.
	Write code for developing responsive web application with Admin panel and tables with static data.
	4. BUIDLING INTERFACES USING JAVASCRIPT

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Write JavaScript to validate the following fields of the Registration page.

- First Name (Name should contains alphabets and the length should not be less than 6 characters). Password (Password should not be less than 6 characters length).
- E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
- Mobile Number (Phone number should contain 10 digits only).
- Last Name and Address (should not be Empty).

5. INTRODUCTION TO INTERATIVE FORMS

- Developing Web Page Styles using JavaScript and CSS,
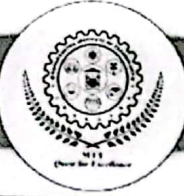- Develop Script interactive forms

6. PHP

- A web application that takes a name as input and on submit it shows a hello page where name is taken from the request. It shows the start time at the right top corner of the page and provides a logout button. On clicking this button, it should show a logout page with Thank You message with the duration of usage (hint: Use session to store name and time).

- A web application that lists all cookies stored in the browser on clicking "List Cookies" button. Add cookies if necessary

7. Database Handling

Implement the web applications with Database using PHP

1. **Mini project** based on above technologies.

	Sr. No.	Title	Author	Publication	Edition
References	1	"Beginning Web Programming",	Jon Duckett,	WROX,	2nd
	2	"Java Script"	D. Flanagan	O'Reilly,	6th
	3	"Java Server Pages",	W Hans Bergsten	O'Reilly,	3rd

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Syllabus of S. Y. B.Tech. All Branches (Semester IV)

Course Code: HSM254	Credits: 0-0-1
Course: Development of Skills (Soft Skills)	Teacher Assessment: 25 Marks
Practical: 2 Hrs./week	End Semester Examination: 25 Marks

Objectives	1. Students will be able to communicate in English accurately and effectively. 2. Students will be able to enhance employability skills. 3. Students will be able to participate in debate and group discussion in English effectively. 4. Students will be able to enhance verbal ability. 5. Students will be able to face interview effectively.
Unit-I	**Common Errors in English Communication** • Grammatical • Spelling • Pronunciation (2 Hrs.)
Unit-II	**Enhancing Employability skills** • Job application • Resume / CV • Essay • Reading Comprehension (6 Hrs.)
Unit-III	**Debate and Group Discussion** • Communication • Appearance • Preparation (4 Hrs.)
Unit-IV	**Verbal Ability-I** • Synonyms • Antonyms • Idioms and Phrases (4 Hrs.)
Unit-V	**Verbal Ability-II**

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	• One word substitution			(4 Hrs.)
	• Word analogy			
Unit-VI	**Interview Skills**			
	• Body language			
	• Grooming			
	• Preparation			(4 Hrs.)

|	Sr. No.	Title	Author	Publication	Edition
Textbooks/ Reference Books	1.	Verbal and Non-Verbal Reasoning	R.S. Agrawal	S. Chand Publication	2018
	2.	Effective Technical Communication	Anne Eisenberge	Mc Graw Hill International Editors	1982
	3.	Professional Communication Skills	A. K. Jain, Pravin, S. R. Bhatia, A. M. Sheikh	S. Chand & Company Ltd.	2001
	4.	Business Communication	Urmila Rai, S. M. Rai	Himalaya Publishing House	2011
	5.	Better English Pronunciation	J.D. O'Connor.	Cambridge University Press	1980
	6.	Grammar of Spoken and Written English	Dauglas Biber, Geoffrey Leech	Longman	1999
	7.	Technical Communication-Principles and Practice	Meenakshi Raman & Sangeeta Sharma	Oxford University Press	2004
	8.	A course in Phonetics & Spoken English	J. Sethi, P.V. Dhamija	PHI publication	2006
	9.	Communication Skills for	Sunita Mishra,	Pearson	2011
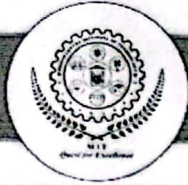
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		C. Murli Krishna	Education	
	Engineers	C. Murli Krishna	Education	
10.	Soft Skills: Enhancing Employability: Connecting Campus with Corporate	M.S. Rao	I.K. International	2013
11.	Technical Communication A Reader Centered Approach	Paul V. Anderson	Thomson Publication	2007
12.	Oxford English Grammar	Sydney Greenbaum	Oxford University Press	1996

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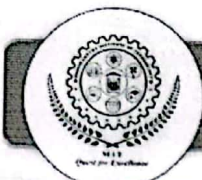
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Syllabus of S. Y. B. Tech. (CSD) Semester IV

Course Code: CSD274	Credits: 0-0-1
Course: Lab-V: Problem Based Learning	Teacher Assessment: 25 Marks
Teaching Scheme:	
Practical: 2 Hrs./week	

Course Objectives:

On completion of the course, learner will be able to –

- To develop positive attitude, new skills or new ways of thinking.
- To introduce independent and group learning by solving real world problem with the help of available resources.
- To be able to develop systematic approach in technical documentation.
- To select and utilize appropriate Software tools/Equipment/Problem solving tools to solve real life problems.

Guidelines:

The students plan, manage and complete a activity which addresses the stated problem.

1. The students must work in group to solve real life problem.

2. A mentor to be assigned to 3-4 groups / one batch.

3. The steps to be followed for problem based learning are as mentioned below:

Step 1: Explore the issue.

Gather necessary information; learn new concepts, principles, and skills about the proposed topic.

Step 2: State what is known.

Individual students and groups list what they already know about the scenario and list what areas they are lacking information.

Step 3: Define the issues.

Frame the problem in a context of what is already known and information the students expect to learn.
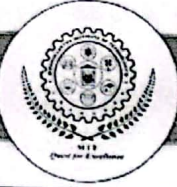
Step 4: Research the knowledge.

Find resources and information that will help create a compelling argument.

Step 5: Investigate solutions.

List possible actions and solutions to the problem, formulate and test potential hypotheses

Step 6: Present and support the chosen solution.

Clearly state and support your conclusion with relevant information and evidence.
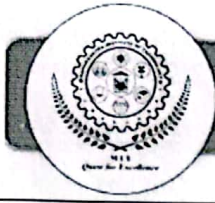
Step 7: Review your performance.

Often forgotten, this is a crucial step in improving the problem-solving skills. Students must evaluate their performance and plan improvements for the next problem.

Recommended parameters for assessment, evaluation and weightage:

1. Identification of the Problem (20%)
2. Documentation (Gathering requirements, design & modeling, implementation/execution, use of technology and final report, other documents). (30%)
3. Demonstration (Poster Presentation/Model Exhibition etc). (20%).
4. Awareness /Consideration of - Environment/ Social /Ethics/ Safety measures/Legal aspects. (10%)
5. Outcome (Participation in technical events / publication in national international conference journal/copyright/patent/prototype). (20%)

| Reference Books/ Research Articles:	Sr. No.	Title	Author
	1	A new model of problem based learning	Terry Barrett
	2	Research Methodology: Methods and Techniques	C. R. Kothari
Web Resources:	1	Problem-Based Learning: https://www.coursera.org/lecture/university-teaching/problem-based-learning-i-pbl-in-practice-SMXol	
	2	Problem-Based Learning: https://onlinecourses.swayam2.ac.in/ntr20_ed29/preview	

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Syllabus of S. Y. B.Tech. All Branches (Semester IV)	

Course Code: HSM805	Credits: 0-0-0
Course: Non-Credits Mandatory course (Professional Ethics and Corporate Social Responsibility)	
Teaching Scheme:	
Theory: 2 Hrs./week	

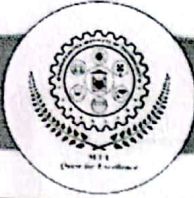|	
Objectives	1 To develop understanding of professional ethics in different organizational context. 2 To identify, analyze, and resolve ethical issues in business decision making. 3 To develop various corporate social Responsibilities and practice in the professional life
Unit-I	**Professional Ethics and Business** The Nature of Business Ethics; Ethical Issues in Business; Moral Responsibility and Blame; Utilitarianism: Weighing Social Costs and Benefits; Rights and Duties of Business. **(4 Hrs.)**
Unit-II	**Professional Ethics in the Marketplace** Perfect Competition; Monopoly Competition; Oligopolistic Competition; Oligopolies and Public Policy Professional Ethics and the Environment: Dimensions of Pollution and Resource Depletion; Ethics of Pollution Control; Ethics of Conserving Depletable Resources. **(4 Hrs.)**
Unit-III	**Professional Ethics of Consumer Protection** Markets and Consumer Protection; Contract View of Business Firm's Duties to Consumers; Due Care Theory; Advertising Ethics; Consumer Privacy. **(4 Hrs.)**
Unit-IV	**Introduction to Corporate Social Responsibility:** Corporate Social Responsibility: Concept, Scope, Relevance, Importance of CSR in Contemporary Society. CSR, Indian Corporations - Legal Provisions and Specification on CSR, A Score Card, Future of CSR. **(4 Hrs.)**
Unit-V	**Potential Business Benefits** Triple bottom line, Human resources, Risk management, Supplier relations; Criticisms and concerns—Nature of business; Motives; Misdirection. **(4 Hrs.)**
Unit-VI	**Corporate Social Responsibility:** Corporate Social Responsibility and Small and Medium Enterprises (SMEs) in India, Corporate Social Responsibility and Public-Private Partnership (PPP) in India. **(4 Hrs.)**

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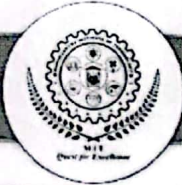(An Autonomous Institute)

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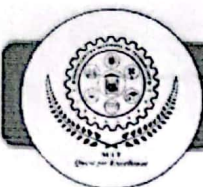
|	Sr. No.	Title	Author	Publication	Edition
Textbooks / Reference Books	1.	Business Ethics: Texts and Cases from the Indian Perspective	Ananda Das Gupta	Springer	2014
	2.	Business Ethics: Concepts and Cases	Manuel G. Velasquez.	Pearson	2014
	3.	Corporate Social Responsibility: Readings and Cases in a Global Context	Andrew Crane, Dirk Matten, Laura Spence;	Routledge	2013
	4.	Corporate Social Responsibility in India	Bidyut Chakrabarty	Routledge	2015

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Course Code: HSM806	Credits: 0-0-0
Course: Non-Credits Mandatory course (Emotional Intelligence)	
Teaching Scheme:	
Theory: 2 Hrs./week	

Objectives	1. To interpret and manage emotions. 2. To learn the four core skills required to practice emotional intelligence. 3. To relate emotional intelligence to the workplace.
Unit-I	Introduction to emotion, Development of emotions and emotional maturity, intelligence & wisdom, Science of Emotional Intelligence, EQ and IQ (4 Hrs.)
Unit-II	Concept, theory, measurement and applications of intelligence, Dimensions of Trait EI Model: Self-awareness, Self-regulation, Motivation, Empathy, Social skills. (4 Hrs.)
Unit-III	Emotional intelligence: concept, theory and measurements, Correlates of emotional intelligence (4 Hrs.)
Unit-IV	Emotional intelligence, culture, schooling and happiness, Emotional Intelligence at Work place: Importance of Emotional Intelligence at Workplace? Cost–savings of Emotional Intelligence. (4 Hrs.)
Unit-V	For enhancing emotional intelligence EQ mapping, Managing stress, suicide prevention, through emotional intelligence, spirituality and meditation. (4 Hrs.)
Unit-VI	Application of emotional intelligence at family, school and workplace, Case Studies Measuring Emotional Intelligence: Emotionally Intelligence Tests. (4 Hrs.)

Textbooks / Reference	Sr. No.	Title	Author	Publication	Edition
	1.	Emotional Intelligence- Why it can Matter More	Daniel Goleman	Bantam Doubleday Dell Publishing	1996

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Books		than IQ		Group	
	2.	Working with Emotional Intelligence	Manuel G. Velasquez.	Bantam Doubleday Dell Publishing Group	2000
	3.	Emotional Intelligence Coaching	Liz Wilson, Stephen Neale & Lisa Spencer-Arnell	Kogan Page India Private Limited	2012
	4.	Corporate Social Responsibility in India	Bradberry, Travis and Jean Greaves	Perseus Books Group	2009
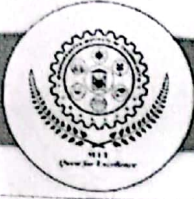
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Syllabus of S. Y. B.Tech. All Branches (Semester II)

Course Code: HSM807	Credits: 0-0-0
Course: Non-Credits Mandatory course (Stress Management Through Yoga)	

Teaching Scheme:

Theory: 2 Hrs./week

Objectives	1	To identify common stressors inherent in today's global marketplace.
	2	To develop an understanding of the impact of stress on physiological, emotional, and cognitive processes.
	3	To learn to manage the stress through art of Yoga
Unit-I		Mental Health: Meaning and Importance; Yogic Perspective of Mental Health, Indicators of Mental Health, Stress: Meaning and Definition; Symptoms, Causes and Consequences of Stress, Meaning of Management – Stress Management, Stress in Modern Culture & Society. **(6 Hrs.)**
Unit-II		Concept of Stress according to Yoga, Assessing your Stress & Building Resilience. **(3 Hrs.)**
Unit-III		Physiology of Stress on: Autonomic Nervous System (ANS), Endocrine System, Hypothalamus, Cerebral Cortex and Neurohumours. **(3 Hrs.)**
Unit-IV		Mechanism of Stress related diseases: Psychic, Psychosomatic, Somatic and Organic phase. Role of Meditation & Pranayama on stress - physiological aspect of Meditation, Constant stress & strain, anxiety. **(4 Hrs.)**
Unit-V		Meaning and definition of Health: various dimensions of health (Physical, Mental, Social and Spiritual) - Yoga and health -Yoga as therapy. Physical fitness. Stress control exercise - Sitting meditation, Walking meditation, Progressive muscular relaxation, Gentle stretches and Massage. **(5 Hrs.)**
Unit-VI		Preventive and curative effects of Yoga on stress related disorders: Hypertension, Heart problems, Bronchial Asthma, Peptic Ulcer, Diabetes Mellitus, Arthritis, Anxiety Neurosis and Headache **(3 Hrs.)**

Textbooks /	Sr. No.	Title	Author	Publication	Edition

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Reference Books	1.	Stress Control for peace of Mind	Linda Wasmer Andrews	Main Street	2005
	2.	Yoga for stress	Vimla Lalvani	Hamlyn	1998
	3.	Yoga perspective in stress management	H.R. Nagendra, and R. Nagarathana,	Swami Vivekananda Yoga Prakashana	2004
	4.	Yoga practices for anxiety & depression	H.R. Nagendra, and R. Nagarathana,	Swami Sukhabodhanandha Yoga Prakashana	2004
	5.	Stress management by Yoga	K.N. Udupa,	Motilal Banaridass Publishers Private Limited.	1996

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