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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 (Electronics and Computer Engineering) 2022-23

S. Y. B. Tech. Syllabus Structure w.e.f. 2022-23 (pattern 2021-2022)

Electronics and Computer Engineering

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 Program (2 Days)											
1.1	BSC	BSC204	Linear Algebra & Transform	3	1	-	4	4	15	15	10	10	50	100
1.2	PCC	ECE201	Electronic Design Technology	3	-	-	3	3	15	15	10	10	50	100
1.3	PCC	ECE202	Network Theory	3	-	-	3	3	15	15	10	10	50	100
1.4	PCC	ECE203	Data Structures and algorithms	3	-	-	3	3	15	15	10	10	50	100
1.5	PCC	ECE204	Programming in JAVA	3	-	-	3	3	15	15	10	10	50	100
1.6	PCC	ECE221	Lab-I: Electronic Design Technology	-	-	2	2	1	-	-	-	-	25	25
1.7	PCC	ECE222	Lab-II: Network Theory	-	-	2	2	1	-	-	-	25	-	25
1.8	PCC	ECE223	Lab-III: Data Structures and algorithms	-	-	2	2	1	-	-	-	25	25	50
1.9	PCC	ECE224	Lab-IV: Programming in JAVA	-	-	2	2	1	-	-	-	-	25	25
1.10	PCC	ECE225	Lab-V: Data Analytics	-	-	2	2	1	-	-	-	25	-	25
1.11	HSM	HSM804	Mandatory Non-Credit Course	2	-	-	2	Mandatory Non-Credit Course						
S3				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	Complex Variable &Vector Calculus	3	1	-	4	4	15	15	10	10	50	100
2.2	PCC	ECE251	Digital Electronics and Microprocessor	3	-	-	3	3	15	15	10	10	50	100
2.3	PCC	ECE252	Database Management System	3	-	-	3	3	15	15	10	10	50	100
2.4	PCC	ECE253	Communication Engineering	3	-	-	3	3	15	15	10	10	50	100
2.5	PEC	ECE281-ECE284	Professional Elective-I	3	-	-	3	3	15	15	10	10	50	100
2.6	PCC	ECE271	Lab-I: Digital Electronics and Microprocessor	-	-	2	2	1	-	-	-	-	25	25
2.7	PCC	ECE272	Lab-II: Database Management System	-	-	2	2	1	-	-	-	25	-	25
2.8	PCC	ECE273	Lab-III: Communication Engineering	-	-	2	2	1	-	-	-	-	25	25
2.9	HSM	HSM254	Lab-IV: Development of Skills (Soft Skills)	-	-	2	2	1	-	-	-	25	25	50
2.10	PCC	ECE274	Lab-V: Problem-based learning	-	-	2	2	1	-	-	-	25	-	25
2.11	HSM	HSM805-HSM807	Mandatory Non-Credit Course	2	-	-	2	Mandatory Non-Credit Course						
S4				17	1	10	28	21	75	75	50	125	325	650

L-Lecture, T-Tutorial, P- Practical, MSE- Mid Semester Exam, CIE-Continuous Internal Evaluation, TA-Teacher Assessment, ESE- End Semester Examination

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Semester-III	**Mandatory Non-Credit Course**
HSM804	Constitution of India

Semester-IV	**Mandatory Non-Credit Course**
HSM805	Professional Ethics and Corporate Social Responsibility
HSM806	Emotional Intelligence
HSM807	Stress Management Through Yoga

Semester-IV	**Professional Elective-I**
ECE281	Computer Organization and Architecture
ECE282	Information Theory and Coding
ECE283	Sensors and Measurement
ECE284	Pattern Recognition

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Faculty of Science & Technology

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

Course Code: BSC204	Credits: 3-1-0
Course: Linear Algebra & Transform	Mid Semester Examination-I: 15 Marks
	Mid Semester Examination-II: 15 Marks
Teaching Scheme:	Continuous Internal Evaluation: 10 Marks
Theory: 3 Hrs/week	Teacher Assessment: 10 Marks
Tutorial: 1Hr/week	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Prerequisite	Basic formulae of trigonometry, Derivative, Integration, Basic knowledge of Determinant and Matrices.
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)
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)

Textbooks / Reference Books	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 VidyarthiGrihaPrakashan,Pune	9th

	6.	A text book of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications	1st
	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. Electronics and Computer Engineering (Semester III)

Course Code: ECE201	Credits: 3-0-0
Course: Electronic Design Technology	Mid Semester Examination-I: 15 Marks
	Mid Semester Examination-II: 15 Marks
Teaching Scheme:	Continuous Internal Evaluation: 10 Marks
Theory: 3 Hrs/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Prerequisite	Basic Electronics
Objectives	1. To study biasing circuits for different semiconductor devices. 2. To study operation of different amplifiers. 3. To do analysis of an amplifier using h-parameters. 4. To study and design electronic circuits, motor driving circuits, measuring instrument (voltmeters and ammeter), modern sensor, noise reduction technique and PCB design.
Unit-I	**Design of Small Signal Amplifier** Transistor configuration, Biasing of Transistor Amplifier, Design of Biasing Circuits(Fixed Bias Circuit, Collector to Base Bias Circuit, Voltage Divider Biasing) ,Bias Stabilization, Transistor T equivalent and r Parameter, Hybrid Model and h Parameter, Design of Common Emitter Amplifier, Design of Common Collector Amplifier , Design of Darlington Emitter follower circuit, Design of Multistage Amplifier. (5 Hrs)
Unit-II	**Design Of IC Based Power Amplifier** IC LM380, Audio Power Amplifier using TBA 810, OPAMP IC 725 as Audio Amplifier. **Special Purpose Amplifier** Design of Pre Amplifier, Design of Audio Circuits, Design of IF Amplifier, Design of Diode Detector. (5 Hrs)
Unit-III	**Design of Regulated Power Supply** Design positive power supply using LM7805 voltage regulators, Design negative power supply using LM790, LM1117 family regulators, LM337 voltage regulators, Design of constant current source using LM317, Design of dual power supply, Design of power supply using LM2576 voltage regulator (5 Hrs)

Unit-IV	**Design of Motor &Relay Drivers**
	BLDC motor, Stepper Motor, Servo motor, Design of Stepper Motor driver using MC3479, Design of dc motor using L293D and L298, ULN2000 family of driver, Isolation techniques using Opto-coupler PC817, Concept of solid state relay. (5 Hrs)
Unit-V	**Concept of Sensors**
	Sensor, Capacitive touch sensor, resistive touch sensor, Accelerometers, Gyroscopes. PIR Sensor, Ultrasonic, Optical encoder, Pneumatic sensors, Environmental sensors: Humidity, Moisture. (5 Hrs)
Unit-VI	**Noise Reduction Techniques**
	Noise Sources, Noise from Power Electronic Systems, Origin of Conducted EMI/EMC, Common and Normal mode Noise, Grounding Techniques, Shielding Techniques, Cabling Techniques
	PCB Designing
	PCB, Types of PCBs, selection criteria, Design rules for analog, digital and mixed circuits, Ground rules in PCB Design, PCB manufacturing process (5 Hrs)

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Printed circuit board: Design, Fabrication, Assembly and Testing Education	R.S. Khandpur,	Tata McGraw-Hill	1st
	2.	Electronic Circuit Design	D. S. Mantri, & G. P. Jain	Nikita Publication	1st
	3.	Electronic Devices and Circuits	J. Millman, C.C.Halkias	TMH	2nd
	4.	Electronic Devices and Circuits	David A. Bell	Oxford	5th

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester III)	
Course Code: ECE202	Credits: 3-0-0
Course: Network Theory	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

Prerequisite	Basic Electrical Engineering
Objectives	1. Understand different Network theorems analysis for AC Networks. 2. To study Different types of Two Port Networks, Filters, Attenuators and Equalizers.
Unit-I	**Graph Theory** Graph of a network, Definitions, Tree, Co tree, Link, basic loop and basic cut set, Incidence matrix, Cut set matrix, Tie set matrix, Loop and Nodal methodsofanalysis. (6 Hrs)
Unit-II	**AC Circuit Analysis** Network Theorems: Thevenin's, Superposition, Norton's and Maximum Power Transfer Theorem, Tellegen's Theorem, Dual Network and Duality theorem. (8 Hrs)
Unit-III	**Frequency Selective Networks** Significance of Quality factor. Series Resonance: Resonant frequency, Impedance, Bandwidth, Selectivity, Magnification factor. Parallel resonance: Resonant frequency, Admittance, Bandwidth and selectivity. (4Hrs)
Unit-IV	**Networks & Filters** Networks: Classifications: Symmetrical and Asymmetrical networks and it's properties. Filters: Filter fundamentals, Pass and stop bands, Characteristic impedance, Constant K low pass filter, Constant K high pass filter, m - derived T section, m -π derived Section, Band pass filters. (8Hrs)
Unit-V	**Attenuators & Equalizers:** Symmetrical and Asymmetrical attenuators, T-type attenuator, π-type attenuator, Lattice attenuator, Bridged T attenuator, L-type attenuator. Equalizer configuration, Inverse network, Two terminal equalizer, Constant

	resistance equalizer, Full series equalizer, Full shunt equalizer, Bridged –T equalizer, Lattice equalizer. (6Hrs)				
Unit-VI	**Two Port Network** Z, Y, H and ABCD parameters, the equivalence of two ports networks, Conversion of parameters. (4 Hrs)				
Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Network Analysis	M. E. Vanvalkanburg	Prentice Hall of India	1st
	2.	Circuit Theory Analysis and Synthesis	Abhijit Chakrabarti	Dhanpat Rai &CO	7th
	3.	Transmission lines and Network	Umesh Sinha	Satya Prakashan	5th
	4.	Network and Lines	J.D. Ryder	Prentice Hall of India	1st

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester III)

Course Code: ECE203	Credits: 3-0-0
Course: Data Structures and Algorithms	Mid Semester Examination-I: 15 Marks
	Mid Semester Examination-II: 15 Marks
Teaching Scheme:	Continuous Internal Evaluation: 10 Marks
Theory: 3 Hrs/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Prerequisite	Knowledge of computer fundamentals and C / C++ programming Language Basic knowledge of algorithms and problem solving
Objectives	1. To understand importance of data structures in implementing efficient programs. 2. To implement basic data structures- stack, queue, linked list. 3. To understand various searching and sorting technique. 4. To learn algorithm development and analysis of algorithms.
Unit-I	**Introduction to Data structures and Algorithm** Need of data structures, Types of data structures, ADT (Abstract Data Types), Concept of Algorithm, Complexity of algorithm, Concept of Primitive and non-primitive, linear and Non-linear, static and dynamic, persistent and ephemeral data structures, Structure and Union, pointers. (6 Hrs)
Unit-II	**Linear Data Structures –Array ,Stack ,Queue** Concept of sequential organization, Concept of Linear data structures, Storage representations such as row major, column major and their address calculation. Stack ,Queue and its implementation (6 Hrs)
Unit-III	**Sorting Techniques** Sorting methods: Bubble, insertion, selection, merge, quick, bucket, heap Time complexity of each sorting algorithm. (6 Hrs)
Unit-IV	**Linear Data Structures using Linked Organization** Concept of linked organization, Comparison with sequential organization, Types of Linked List- singly linked list, doubly linked list, circular linked List and its implementation (6 Hrs)
Unit-V	**Non-Linear Data Structure** Concept of non-linear data structure, Trees and binary trees-concept and terminology , Binary Search Tree, Tree traversal techniques, Graph-concept and terminology, graph traversal Techniques (6 Hrs)
Unit-VI	**Searching Techniques** Searching methods: Linear and binary search, Hashing, B-tree and B+tree , VL –tree. (6 Hrs)

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Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Data Structures using C and C++	Augensteinand Tenenbaum Langsam	Prentice Hall of India	2nd
	2.	Data Structures and Program Design in C"	Robert L. Kruse , Bruce P. Leung	Prentice Hall	2nd
	3.	Fundamentals of Data Structures in C++	E. Horowitz, S. Sahni, D. Mehta	Galgotia Book Source, New Delhi	1st
	4.	Data Structures through C	Yashvant P. Kanetkar	BPB Publication	2nd
	5.	Data Structures	Seymour Lipschutz	McGraw Hill Education	1st
	6.	Fundamentals of Data Structures in C	E. Horowitz, S. Sahani and S.Anderson- Freed	University Press	2nd

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester III)

Course Code: ECE204	Credits: 3-0-0
Course: Programming in JAVA	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

Prerequisite	Knowledge of C++ programming language.
Objectives	1. To understand Object Oriented Programming concepts and basic characteristics of Java 2. To know the principles of packages, inheritance and interfaces 3. To define exceptions and use I/O streams 4. To design simple applets.
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** Keywords and 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 a 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 keyword.　　(6 Hrs)
Unit-IV	**Inheritance, Interfaces and Packages** Inheritance in java, types of inheritance, Super and sub class, defining a subclass, method overriding, Finalizers, Abstract class and methods, visibility controls. Interface in java, defining Interfaces, extending and implementing interfaces. Packages: Defining package, creation of package, importing packages.　　(6Hrs)

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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. Introduction to applets, applets and applications, creating applet, life Cycle of an Applet, designing a webpage, applet tag, adding applet to html page, running the applet (6 Hrs)

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Java: The Complete Reference	Herbert Schildt	McGraw Hill Education	11th
	2.	Programming with Java	E Balagurusamy	McGraw Hill Education	6th
	3.	Programming in Java	Sachin Malhotra Saurabh Chaudhary	Oxford University Press	2nd
	4.	Java: How to program	Deitel	Pearson	11th

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester III)

Course Code: ECE221 Course: Lab-I :Electronic Design and Technology **Teaching Scheme:** Practical: 2 Hrs/week	Credits: 0-0-1 ESE/Oral :25Marks

Prerequisite	Basic Electronics
Objectives	To study and design electronic circuits, motor driving circuits, modern sensor, noise reduction technique and PCB design.
List of Practicals	1. Design Audio Amplifier using LM 380. 2. Design of Stereo Amplifier using TBA 810. 3.Design of Variable DC Power supply using LM 317 4.Design constant current source using LM1117 5. Design DC Motor Driver circuit using LM 293D. 6. Design Stepper motor driver using MC3479 IC. 7. Design isolated relay driver board using ULN2003 and PC817. 8. Study of various sensors. 9. Design of PCB layout using software. 10. Design battery charger for lead-acid battery.
List of Equipments /Instruments	Proteus circuit simulation software, Eagle PCB layout design software, Multimeter, Power Supply, Connecting wires, Patch chord, Copper clad, Solder metal, Zero PCB, Solder gun, Flux, PCB drilling machine, Drill beats, Etching machine, Etching solution, Photo-printing machine.

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Printed circuit board: Design, Fabrication, Assembly and Testing Education	R.S. Khandpur,	Tata McGraw-Hill	1st
	2.	Electronic Circuit Design	D. S. Mantri, & G. P. Jain	Nikita Publication	1st

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	3.	Electronic Devices and Circuits	J. Millman, C.C.Halkias	TMH	2nd
	4.	Electronic Devices and Circuits	David A. Bell	Oxford	5th

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester III)

Course Code: ECE222 Course: Lab-II: Network Theory **Teaching Scheme:** Practical: 2 Hrs/week	Credits: 0-0-1 TA: 25Marks

Prerequisite	Basic Electrical Engineering
Objectives	1. To perform practical by applying knowledge of different laws/ Network Theorems/ Networks and interpret the data. 2. To perform practical by applying knowledge of resonance, filters and interpret the data.
List of Practicals	1. To Verify Superposition Theorem 2. To Verify Thevenins and Norton' Theorem. 3. To Verify Maximum Power Transfer theorem. 4. To plot Frequency response of series resonance circuit. 5. To plot Frequency response of parallel resonance circuit 6. To plot Frequency response of Low Pass filter. (Active/Passive) 7. To plot Frequency response of High Pass filter. (Active/Passive) 8. Determination of A, B, C, D parameters of Two portNetwork. 9. Z Parameters of Two Port Network. 10. Y Parameters of two port Network.
List of Equipments /Instruments	Bread Board, Active and passive components, Cathode Ray Oscilloscope, Function Generators, CRO Probes, patch chords, Power supply, Multimeter, Ammeter, Voltmeter , single stand wire/ multistand wire , Filter Circuitry, Transmission Line Kit..

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Printed circuit board: Design, Fabrication, Assembly and Testing Education	R.S. Khandpur	Tata McGraw-Hill	1st

	2.	Electronic Circuit Design	D. S. Mantri, & G. P. Jain	Nikita Publication	1st
	3.	Electronic Devices and Circuits	J. Millman, C.C.Halkias	TMH	2nd
	4.	Electronic Devices and Circuits	David A. Bell	Oxford	5th

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Course Code: ECE223	Credits: 0-0-1
Course: Lab-III: Data Structures and Algorithms	TA: 25Marks ESE/Oral :25 Marks
Teaching Scheme: Practical: 2 Hrs/week	

Prerequisite	Knowledge of computer fundamentals and C / C++ programming Language Basic knowledge of algorithms and problem solving
Objectives	1.To implement basic data structures 2. To implement sorting and searching techniques
List of Practicals	1. Program for Structure. 2. Program for Union. 3. Program for array implementation of stack. 4. Program for array implementation of queue. 5. Program for bubble sort. 6. Program for quick /merge sort. 7. Program for single linked list. 8. Program to implement tree. 9. Program for Linear search. 10. Program for Binary Search.
List of Equipments /Instruments	Computer system C compiler

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Data Structures using C and C++	Augensteinand Tenenbaum Langsam	Prentice Hall of India	2nd
	2.	Data Structures and Program Design in C"	Robert L. Kruse , Bruce P. Leung	Prentice Hall	2nd
	3.	Fundamentals of Data Structures	E. Horowitz, S. Sahni, D. Mehta	Galgotia Book Source, New	1st

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4.	Data Structures through C	Yashvant P. Kanetkar	BPB Publication	2nd
5.	Data Structures	Seymour Lipschutz	McGraw Hill Education	1st

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester III)	

Course Code: ECE224 Course: Lab-IV: Programming in JAVA **Teaching Scheme:** Practical: 2 Hrs/week	Credits: 0-0-1 ESE/OR :25 Marks

Prerequisite	Knowledge of C++ programming language.
Objectives	1. To understand Object Oriented Programming concepts and basic characteristics of Java 2. To know the principles of packages, inheritance and interfaces 3. To define exceptions and use I/O streams 4. To design simple applets.
List of Practicals	1. Transform the given machine to development ready machine for Java Development and print hello world. 2. Write a program to print area and perimeter for a circle for given value. 3. Write a program to sort the integers in an array. 4. Write a program to convert the decimal number into binary number. 5. Write a program to demonstrate working of constructor and destructor. 6. Write a program to sort data in ascending and descending order using member functions asec() and dsec(). 7. Write a program to demonstrate inheritance. 8. Write a program to demonstrate how to create custom packages in Java. 9. Write a program to demonstrate exception handling in java through try- catch statements. 10. Write a program to copy contents of one file to another file. 11. Design an AWT program to perform various mathematical operations 12. Write a program to demonstrate multithreading in Java
List of Equipments /Instruments	Computer Systems

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Java: The	Herbert Schildt	McGraw Hill	11th

				Education	
		Complete Reference		Education	
	2.	Programming with Java	E Balagurusamy	McGraw Hill Eduction	6th
	3.	Programming in Java	Sachin Malhotra Saurabh Chaudhary	Oxford University Press	2nd
	4.	Java: How to program	Deitel	Pearson	11th

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester III)

Course Code: ECE225 Course: Lab-V: Data Analytics **Teaching Scheme:** Practical: 2 Hrs/week	Credits: 0-0-1 TA: 25Marks

Prerequisite	Knowledge of C++ programming language.
Objectives	Understand the R Programming Language. Exposure on visualizing data science problems. Understand the classification and Regression Model.

List of Practicals	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.

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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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Faculty of Science & Technology	
Syllabus of S. Y. B.Tech. Mechanical Engineering (Semester III)	
Course Code: HSM804 Course: Constitution of India (Non-credit Mandatory course) **Teaching scheme:** Theory: 2 hrs. /week	Credit: 0-0-0
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] (2Hrs)
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)** (5Hrs)
Unit-IV	**Directive Principles of State Policy (DPSP's)** Meaning and Significance of Directive Principles; Classification/ Principles of D.P.S.P.; Relationship between F.Rs. and D.P.S.P. (4Hrs)

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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 (4 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. (4 Hrs)

References	Sr. No.	Title	Author	Publication	Edition
	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 NarainAgrawal 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	Dr. S.N. Busi,	Ava Publishers	First Edition, 2016

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		Volume)			
	8.	Indian Constitution Law,	M.P. Jain,	Nexis	7th Edn. 2014
	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	Credits: 3-1-0
Course: Complex Variable &Vector Calculus	Mid Semester Examination-I: 15 Marks
	Mid Semester Examination-II: 15 Marks
Teaching Scheme:	Continuous Internal Evaluation: 10 Marks
Theory: 3 Hrs/week	Teacher Assessment: 10 Marks
Tutorial: 1Hr/week	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Prerequisite	Basic formulae of trigonometry, Derivative, Integration, algebra of complex numbers, fundamentals of vector algebra.
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)
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)

Textbooks / Reference Books	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 Mathematics	N. P. Bali and Manish Goyal	Laxmi Publications	1st
	7.	Advanced Engineering Mathematics.	H. K. Dass	S. Chand And Co. Ltd	18th

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester IV)

Course Code: ECE251	Credits: 3-0-0
Course: Digital Electronics and Microprocessor	Mid Semester Examination-I: 15 Marks
	Mid Semester Examination-II: 15 Marks
Teaching Scheme:	Continuous Internal Evaluation: 10 Marks
Theory: 3 Hrs/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Prerequisite	Basic Electronics
Objectives	To Study 1.Number systems with its conversions 2.Boolean laws and its use in logic functions minimization 3.Combinational Circuits 4.Sequential circuits 5. Introduction of Microprocessor 8085.
Unit-I	**Number system and coding techniques** Introduction, Number systems: Binary, Octal, Decimal and Hexadecimal, and their Conversion methods, Signed Binary numbers : 1's and 2's complement representation, Binary arithmetic, Codes: Classification, BCD code, Excess-3 code, Gray code, Alphanumeric code, Error detecting and correcting code. (6 Hrs)
Unit-II	**Logic Gates, Boolean algebra and minimization techniques** Introduction, Digital Signals, Basic Digital circuits: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR, Karnaugh map representation and minimization of logical functions upto 4-variables, Don't care conditions, Boolean Algebra, De-Morgan'stheorems, Simplification using Boolean algebra, Standard representation forlogical functions, SOP and POS form. (6 Hrs)
Unit-III	**Combinational Logic Circuits** Code converters: Binary to Gray code converter, Gray to Binary code converter, Design Examples: Arithmetic Circuits, Adders and their use as subtractors, parallel adder , look ahead carry, BCD Adder.Block diagram of combinational logic, Multiplexers and their use in combinational logic designs, multiplexer trees, Demultiplexers and their use in combinational logic designs, Demultiplexer trees, decoder, encoder, ALU (6 Hrs)
Unit-IV	**Sequential Logic Circuits** SR, JK, MasterSlave J-K flip flop, D and T flip-flops, Excitation Table for flip

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	flops, Application of Flip flops, **Shift Registers**: Introduction, Data formats, Register classification, modes of operation of shift register, Bidirectional shift register, universal shift register, **Counters:** Classification and the design steps, Ripple or asynchronous counter, modulus of counter, UP/DOWN counter (6 Hrs)
Unit-V	**Microprocessor 8085** Types of microprocessors, most popular microprocessors, Comparison between microprocessor and microcontrollers, Architecture of 8085, brief description of ALU, register section, data & address buses. (6 Hrs)
Unit-VI	**Programming of 8085** Basics of Instruction, Group of instruction, Addressing modes of Instruction, 8085 instruction set, Machine Language, Assembly Language comparison, Assembly Language programming (Simple Problems). (6 Hrs)

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Modern Digital Electronics	R.P.Jain	Tata Mc-Graw hill,	4th
	2.	Digital Logic and Computer Design	M. Marris Mano	PHI, New Delhi	1st
	3.	Digital Principles and Application,	Malvino and Leach,	TMH, New Delhi,	4th
	4.	Microprocessor Architecture, Programming & Applications,	Ramesh Gaonkar	Penram publications	6th

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester IV)

Course Code: ECE252	Credits: 3-0-0
Course: Database Management System	Mid Semester Examination-I: 15 Marks
	Mid Semester Examination-II: 15 Marks
Teaching Scheme:	Continuous Internal Evaluation: 10 Marks
Theory: 3 Hrs/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Prerequisite	Basic Knowledge of file system, storing data in file system and Operations on sets, Data Structures
Objectives	1. Understand and list fundamental concepts of Database Management 2. Design methodology for databases and verifying their Structural Correctness. 3. Identify and list various components of Database Management. 4. Understand issues of Concurrency, Transactions, and RDBMS.
Unit-I	**Introduction** Database, Management Systems, Comparison with File Systems. Advantages and Disadvantages of Database Management Systems, Applications. Database Architecture: Components of DBMS and Overall structure of DBMS; Various types of databases. (4 Hrs)
Unit-II	**Data Modeling** Need of Data Modeling, Types of Data Models. Entity Relationship Model: Entities, Attributes, Relationships- types, Constraints, Keys, Design Process, ER-Model, ER Diagram. Converting ER models to Database Tables. Case Study- Design ER Model for Railway Reservation System converts it to Database tables. (6 Hrs)
Unit-III	**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

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	Queries, and Database Modification using SQL Insert, Update and Delete Queries. Basics of PL/SQL: Concept of Stored Procedures & Functions, Cursors, Triggers, Assertions, roles, and privileges. (8 Hrs)
Unit-IV	**Relational Databases**
	Relational Model: Basic concepts, Attributes and Domains, CODD's Rules. Relational Integrity: Domain, Referential Integrities, Enterprise Constraints, Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, 2NF, 3NF, BCNF. (6 Hrs)
Unit-V	**Database Transactions**
	Basic concept of a Transaction, Transaction Management, Properties of Transactions, Concept of Schedule, Serial Schedule, Serializability: Conflict and View, Concurrency Control: Need, Locking Methods, Deadlocks, Time stamping methods. (6 Hrs)
Unit-VI	**Case Studies:**
	• Comparative Study of SQL and NoSQL
	• Advantages of MongoDB
	• Issues in unstructured data from Social Media. (6 Hrs)

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Database System Concepts	Silberschatz A., Korth H., Sudarshan S.	McGraw Hill Publishers, ISBN 0-07-120413-X	6th
	2.	Database Systems	Connally T, Begg C.	Pearson Education, ISBN 81-7808-861-4	4th
	3.	Fundamental Database Systems	Ramez Elmasri, Shamkant B. Navathe	Pearson Education, 2003, ISBN 978-0321204486.	3rd
	4.	Database Management System	Raghu Ramkrishnan, Johannes Gehrke	McGraw Hill International Editions, ISBN 978-0072465631	2nd

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester IV)

Course Code: ECE253	Credits: 3-0-0
Course: Communication Engineering	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

Prerequisite	Electronic Devices and circuits
Objectives	1. To introduce various modulation and demodulation techniques used in communication 2. To understand different Pulse Modulation Techniques. 3. To know the function of each block in AM and FM receivers and different parameters of the communication system. 4. To introduce various digital modulation techniques.
Unit-I	**Introduction** Frequency spectrum, Block schematic of communication system, Types of Communication System, Need of modulation, Types of modulations. comparison between analog and digital modulation. **Introduction to Noise:** Noise Sources & Types, SNR, Noise Figure, Noise Temperature. Numerical based on theory. (6 Hrs)
Unit-II	**Amplitude Modulation** Types of AM - DSBFC, DSBSC, SSB, VSB – Modulation index, Spectra, Power relations and Bandwidth – Generation of AM wave, DSBSC Generation methods –FET Balanced modulator, SSB Generation methods – Filter, Phase Shift and Third Method. Numericals based on theory. (6 Hrs)
Unit-III	**Angle Modulation** Phase and frequency modulation, Narrow Band and Wideband FM, mathematical analysis, Modulation index, Spectra, Power relations and Transmission Bandwidth , FM generation ,Direct and Indirect Method. Numericals based on theory (6Hrs)
Unit-IV	**Pulse Modulation Techniques** Pulse Modulation Techniques: Sampling theorem, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation & its applications. (6 Hrs)
Unit-V	**AM and FM Receivers**

	Block Diagram of AM Super Heterodyne Receiver, Performance Characteristics of AM Receiver: Sensitivity, Selectivity, Fidelity, Image frequency and IFRR, Tracking and Double Spotting. Block Diagram of FM Receiver, Effect of Noise on A.M & F.M System, Pre-emphasis &De-emphasis. (6 Hrs)
Unit-VI	**Digital Communication** B.D.of Digital communication system, Advantages and applications of digital communication. Digital modulation Techniques: Delta Modulation, Adaptive Delta Modulation, ASK FSK PSK. (6 Hrs)

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Electronics & Communication System	George Kennedy and Bernard Davis	McGraw Hill Education	1st
	2.	Principles of Communication Systems"	Taub Schilling	Tata McGraw Hill FourthEdition.	1st
	3.	Digital Communications	Simon Haykins	Wiley Publications	4th
	4.	Electronic Communication	Roddy & Coolen	PHI	1st
	5.	Analog and Digital Communication	K. Sam Shanmugam	Willey, 2005	2nd

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester IV)

Course Code: ECE281	Credits: 3-0-0
Course: Professional Elective-I	Mid Semester Examination-I: 15 Marks
Computer Organization and	Mid Semester Examination-II: 15 Marks
Architectures	Continuous Internal Evaluation: 10 Marks
Teaching Scheme:	Teacher Assessment: 10 Marks
Theory: 3 Hrs/week	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Prerequisite	A basic knowledge of fundamental electronic components like Adder, Subtractor, Logic gates .
Objectives	1. To learn the Mathematical operations related to Booth's algorithm. 2. To learn the Processor Organization. 3. To learn the Memory Organization. 4. To learn the concept of Pipelining.
Unit-I	**Introduction** Computer Architecture, Computer Organization, Example, Binary Arithmetic, 1's and 2's complement operations, Rules for addition and Subtraction, Booth's Algorithm- Flowchart. Examples. (6 Hrs)
Unit-II	**Processor Organization** A block diagram of Processor Organization, Component details, Design issues, Processor operation, T-State, Machine Cycle, Instruction Cycle, Fetch-Decode-Execute Cycle. (6 Hrs)
Unit-III	**Control Unit Design** Basic elements, Registers, CPU with internal Bus, RISC Vs CISC, Microprogrammed Control Unit- Design, Principle, Function. Hardwired control Unit- Design, Principle, Function. (6 Hrs)
Unit-IV	**Memory Organization:** Memory, Memory Need, Memory Hierarchy, Characteristics of hierarchy, Cache Memory, Need, Principle, Types/Levels, Cache Operations, Cache Memory- Main Memory mapping techniques- Direct, Associative, Set Associative. (6 Hrs)
Unit-V	**Pipelining** Introduction, Definition, Requirement, Hazards: Data Hazards, Control Hazards, Instruction Hazards, Examples, Stalling, Data Dependency. (6 Hrs)
Unit-VI	**Advanced Processors** History of Processors, Characteristics. Processor Types: Core2Duo, Dual Core, Comparison, Current trend of designing a processor. (6 Hrs)

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Computer Organization	Hamachaer and Zaky	McGraw Hill	6th
	2.	Computer Architecture and Organization	John P. Hayes	McGraw Hill	7th
	3.	Computer Architecture & Organization	Subrata Ghoshal	Pearson	4th
	4.	Computer Organization and Design	P.Pal Choudhari	PHI	5th

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Syllabus of S. Y. B.Tech Electronics and Computer Engineering (Semester IV)

Course Code: ECE282	Credits: 3-0-0
Course: Professional Elective-I	Mid Semester Examination-I: 15 Marks
Information Theory and Coding	Mid Semester Examination-II: 15 Marks
Teaching Scheme:	Continuous Internal Evaluation: 10 Marks
Theory: 3 Hrs/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Prerequisite	Communication, Matrix algebra.
Objectives	1. To understand Information Theory concepts. 2. To understand the structures of the codes and its applications.
Unit-I	**Information theory** Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies. (6 Hrs)
Unit-II	**Channel capacity** Channel Models, Capacity, Coding, Information, Capacity Theorem, Shannon Limit, channel capacity for MIMO system and random selection of Codes. (6 Hrs)
Unit-III	**Linear Block Code for Error Correction** Basic definitions, matrix description, parity check code, decoding, and syndrome decoding, hamming code. (6 Hrs)
Unit-IV	**Cyclic Code** Polynomials, matrix description, quasi-cyclic code, shortened cyclic code, burst error Correction, fire codes, Glory code, and CRC code (6 Hrs)
Unit-V	**Convolution Codes** Encoding of Convolutional Codes- Structural and Distance Properties, state, tree, trellis diagrams, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system. (6 Hrs)

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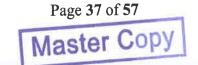| Unit-VI	**BCH Codes** Minimum distance and BCH bounds, Decoding procedure for BCH codes, Syndrome computation and iterative algorithms, Error locations polynomials for single and double error correction (6 Hrs)				
Textbooks / Reference Books	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1.	Information Theory, Coding and Cryptography	Ranjan Bose	TMH.	2nd
	2.	Digital Communication	J. G. Proakis	MGH	4th
	3.	Error Control Coding-Fundamentals and Applications	Shu Lin, Daniel J. Costello	Prentice Hall	1st
	4.	Error Correcting Coding Theory	Man Young Rhee	McGraw – Hill	1st

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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester IV)

Course Code: ECE283	Credits: 3-0-0
Course: Professional Elective-I Sensors and Measurement	Mid Semester Examination-I: 15 Marks
	Mid Semester Examination-II: 15 Marks
Teaching Scheme:	Continuous Internal Evaluation: 10 Marks
Theory: 3 Hrs/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Prerequisite	Knowledge of physical measurement quantities and electronic parameters
Objectives	1.To study types of sensors (transducers) working principles, applications of sensing systems. 2.To understand theory & applications on measurements of electronic systems.
Unit-I	**Measurement System** Generalized Measurement System, Basic methods of measurement, Performance Characteristics, Static Characteristics, Dynamic Characteristics, Errors, Classification of errors, error analysis, Statistical methods, Calibration, system of Units and standards. (6 Hrs)
Unit-II	**Mechanical and Electromechanical sensor** Definition, principle of sensing & transduction, classification. Resistive (potentiometric type): Forms, material, resolution, accuracy, sensitivity. Inductive sensor: common types Reluctance change type, Mutual inductance change type, transformer action type. (6 Hrs)
Unit-III	**Thermal sensors** Material expansion type: solid, liquid, gas & vapor Resistance change type: RTD materials, tip sensitive & stem sensitive type Thermo emf sensor: types, thermoelectric power, general consideration, Junction semiconductor type IC and PTAT type. (6 Hrs)
Unit-IV	**Magnetic sensors** Thomson effect, Hall effect, and Hall drive, performance characteristics. Radiation sensors: LDR, Photovoltaic cells, photodiodes, photo emissive cell types, materials, construction, response. Introduction to smart sensors. (6 Hrs)
Unit-V	**Capacitive sensors** Variable distance-parallel plate type, variable area- parallel plate, variable dielectric constant type, calculation of sensitivity. Stretched diaphragm type:

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		microphone, response characteristics. Piezoelectric element: piezoelectric effect, ultrasonic sensors.			(6 Hrs)
Unit-VI		**Measuring instruments** CRO, Q-meter, RX Meter, Phase Meter, Digital encoder, Introduction to acoustic transducers, spectrum analyzer, network analyzer. (6 Hrs)			

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	A Course in Electrical and Electronics Measurements and Instrumentation	Sawhney A. K.	Dhanpat Rai & Company Private Limited	18th
	2.	Electrical Measurements and Measuring Instruments	Golding. E. W, and Widdis F.C	A. H. Wheeler & Company	5th
	3.	Electronic Instrumentation	Kalsi H. S	Tata McGraw Hill Company	2nd
	4.	Measurement systems, Application and Design	Ernest o Doebelin and Dhanesh N Manik	McGraw-Hill	5th

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Syllabus of S. Y. B.Tech Electronics and Computer Engineering (Semester IV)

Course Code: ECE284	Credits: 3-0-0
Course: Professional Elective-I	Mid Semester Examination-I: 15 Marks
Pattern Recognition	Mid Semester Examination-II: 15 Marks
Teaching Scheme:	Continuous Internal Evaluation: 10 Marks
Theory: 3 Hrs/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Prerequisite	Students required the knowledge of all basic concepts related to calculus and differential equations.
Objectives	1.To learn different pattern recognition techniques 2. To study Different types of Supervised/Unsupervised Techniques.
Unit-I	**Introduction** Importance of pattern recognition, Features, Feature Vectors, and Classifiers, Supervised, Unsupervised, and Semi-supervised learning　　　(4 Hrs)
Unit-II	**Baye's Decision Theory:** Baye's Decision Theory, Minimum Error Rate, Classification, Classifiers, Discriminate Functions and Decision Surfaces, Error Probabilities And Integral.　　　(6 Hrs)
Unit-III	**Data Transformation and Dimensionality Reduction:** Introduction, Basis Vectors, The Karhunen Loeve (KL) Transformation, Singular Value Decomposition, Independent Component Analysis (Introduction only). Nonlinear Dimensionality Reduction, Kernel PCA.　　　(6Hrs)
Unit-IV	**Estimation of Unknown Probability Density Functions:** Maximum Likelihood Parameter Estimation, Probability estimation, Bayesian Interference, Maximum Entropy Estimation, Mixture Models, Naive-Bayes Classifier, The Nearest Neighbor Rule.　　　(6 Hrs)
Unit-V	**Linear Classifiers** Introduction, Linear Discriminant Functions and Decision hyperplanes, The Perceptron Algorithm, Mean Square Error Estimate, Stochastic Approximation of LMS Algorithm, Sum of Error Estimate.　　　(6 Hrs)
Unit-VI	**Nonlinear Classifiers** The XOR Problem, The two Layer Perceptron, Three Layer Perceptron, Back propagation Algorithm, Basic Concepts of Clustering, Introduction to

		Clustering , Proximity Measure.			(8Hrs)
Textbooks / Reference Books	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1.	Pattern Classifier	Richard O Duda, Peter E Hert	Second Edition John Willey Publications	1st
	2.	Patter Recognition And Image Analysis	Earl Gose ,Steave Jost	PHI 2004	1st

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Course Code: ECE271 Course: Lab- I: Digital Electronics and Microprocessor **Teaching Scheme:** Practical: 2 Hrs/week	Credits: 0-0-1 ESE/Oral :25 Marks

Prerequisite	Basic Electronics
Objectives	To Study • Number systems with its conversions • Boolean laws and its use in logic functions minimization • Combinational Circuits • Sequential circuits • Microprocessor and interfacing devices.
List of Practicals	1. Study of logic gates, verification by truth table. 2. Realization of half and full adder using gates. 3. Realization of half and full subtractor using gates. 4. Design and realization of Binary to Gray code converter. 5. Design and implementation of BCD to seven segment decoder. 6. Study and Verification of multiplexer 7. Study and verification ofJ-K, T and D Flip-flop. 8. Introduction of 8085. 9 Basic arithmetic operation using different addressing modes. 10 Interfacing with external peripheral devices by using 8085
List of Equipments /Instruments	1.D.E. Kits, 2. IC's 3. Connecting wires. 4. Multimeter 5. 8085 kit and peripherals.

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Modern Digital Electronics	R.P.Jain	Tata Mc-Graw hill,	4th

2.	Digital Logic and Computer Design,	M. Marris Mano,	PHI,New Delhi,	1st
3.	Digital Principles and Application,	Malvino and Leach,	TMH, New Delhi,	4th
4.	Microprocessor Architecture, Programming & Applications,	Ramesh Gaonkar	Penram publications	6th

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Course Code: ECE272 Course: Lab- II: Database Management System **Teaching Scheme:** Practical: 2 Hrs/week	Credits: 0-0-1 TA: 25Marks

Prerequisite	Concept of Data Structures
Objectives	1. Develop ER models for given scenario. 2. Implement SQL queries on given database.
List of Practicals	1. Prepare ER Model for given scenario. 2. Take an ER Model and convert it to database. 3. Set up environment for SQL and perform SQL queries to Create, update, drop table. 4. Write simple SQL Queries on the given schema 5. Write SQL queries using aggregates, grouping, and ordering statements for given scenario. 6. Write SQL queries for given schema using Nested Sub-queries and SQL Updates 7. Apply PL/SQL- Stored Procedures and Functions. 8. Apply PL/SQL- Triggers and Cursors 9. Select any real time problem for database implementation. Draw an ER diagram for the Given. Normalize the database up to appropriate normal form 10. Mini Project- Select Problem, Develop ER Model, prepare database schema, execute queries to retrieve data.
List of Equipments /Instruments	1. Any ERD Design Tool (like dbdiagram.io, draw.io, Lucid chart. 2. Any SQL interface (like Oracle, MySQL, Postgres, etc.)

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Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	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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Course Code: ECE273	Credits: 0-0-1
Course: Lab-III: Communication Engineering	ESE/Oral :25 Marks
Teaching Scheme:	
Practical: 2 Hrs/week	

Prerequisite	Basics of Communication
Objectives	1. To measure different parameters. 2. Analyze the waveforms
List of Practicals	1. AM Generation (DSB-FC): Calculation of modulation index by graphical method 2. Study of Frequency modulator & demodulator 3. Verification of Sampling Theorem, PAM Techniques, (Flat top & Natural sampling), reconstruction of the original signal 4. Measurement of Performance Characteristics of Receiver: Sensitivity, Selectivity, Fidelity 5.Study of PWM and PPM 6. Study of Pulse Code modulation anddemodulation 7. Study of Delta Modulation 8. Study of Adaptive Delta Modulation 9. Study of ASK 10. Study of FSK * Industrial visit to a Radio Station must be arranged.
List of Equipments /Instruments	1. Kit 2.Function Generator 3.Oscilloscope 4. DC Power supply.

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Electronics & Communication System	George Kennedy and Bernard Davis	McGraw Hill Education	1st
	2.	Principles of Communication Systems"	Taub Schilling	Tata McGraw Hill FourthEdition.	1st

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	3.	Digital Communications	Simon Haykins	Wiley Publications	4th
	4.	Electronic Communication	Roddy & Coolen	PHI	1st

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

Prerequisite	
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

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		• Antonyms			
		• Idioms and Phrases			(4 Hrs)
Unit-V		**Verbal Ability-II**			
		• One word substitution			
		• Word analogy			(4 Hrs)
Unit-VI		**Interview Skills**			
		• Body language			
		• Grooming			
		• Preparation			(4Hrs)

Textbooks/ Reference Books	Sr. No.	Title	Author	Publication	Edition
	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	DauglasBiber, Geoffrey Leech	Longman	1999
	7.	Technical Communication-Principles and	Meenakshi Raman & Sangeeta Sharma	Oxford University Press	2004

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		Practice		
8.	A course in Phonetics & Spoken English	J. Sethi, P.V. Dhamija	PHI publication	2006
9.	Communication Skills for Engineers	Sunita Mishra, C. Murli Krishna	Pearson Education	2011
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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Syllabus of S. Y. B.Tech. Electronics and Computer Engineering (Semester IV)

Course Code: ECE274	Credits: 0-0-1
Course: 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 are as 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.

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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 and 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%)

Sr. No.	Title	Author
1.	A new model of problem based learning	Terry Barrett
2.	Research Methodology: Methods and Techniques	C. R. Kothari
	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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Course Code: HSM805 Course: Non-Credit Mandatory course (Professional Ethics and Corporate Social Responsibility) **Teaching Scheme:** Theory: 2 Hrs/week	Credits: 0-0-0
Objectives	- To develop understanding of professional ethics in different organizational context. - To identify, analyse, and resolve ethical issues in business decision making. - 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 and Importance of CSR in Contemporary Society. CSR and Indian Corporations- Legal Provisions and Specification on CSR, A Score Card, Future of CSR. (4 Hrs)

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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)

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	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-Credit 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 Books	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1.	Emotional Intelligence- Why it can Matter More than IQ	Daniel Goleman	Bantam Doubleday Dell Publishing Group	1996
	2.	Working with	Manuel G.	Bantam	2000

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		Emotional Intelligence	Velasquez.	Doubleday Dell Publishing Group	
	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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Course Code: HSM807 Course: Non-Credit Mandatory course (Stress Management Through Yoga) **Teaching Scheme:** Theory: 2 Hrs/week	Credits: 0-0-0
Objectives	• To identify common stressors inherent in today's global marketplace. • To develop an understanding of the impact of stress on physiological, emotional and cognitive processes. • 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)

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Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	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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