COURSE STRUCTURE AND DETAILED SYLLABI FOR

FOUR YEARS B.TECH

UNDER ACADEMIC REGULATIONS R20

FOR

B. Tech Regular (Full-Time) Four Year Degree Courses

(For the Batches Admitted From 2020-2021)

&

B. Tech (Lateral Entry Scheme)

(For the Batches Admitted From 2021-2022)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

Accredited by NBA, New Delhi & NAAC with A Grade, Bengaluru

Affiliated to JNTUA, Ananthapuramu, Recognized by the UGC under Section 12(B) and 12(F) | Approved by AICTE, New Delhi.

R.V.S. Nagar, TIRUPATI ROAD, CHITTOOR- 517 127(A.P)-INDIA

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SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B.Tech., I Semester

S.NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	BS	20AHS10	Numerical Methods	3	0	0	3	40	60	100
2	PC	20ACS06	Computer Organization and Architecture	3	0	0	3	40	60	100
3	PC	20ACS07	Object Oriented Programming through JAVA	3	0	0	3	40	60	100
4	PC	20AIT01	Automata & Compiler Design	3	0	0	3	40	60	100
5	PC	20ACS08	Relational Database Management Systems	3	0	0	3	40	60	100
6	PC LAB	20ACS09	Object Oriented Programming through JAVA Lab	0	0	3	1.5	40	60	100
7	PC LAB	20AIT02	Automata & Compiler Design Lab	0	0	3	1.5	40	60	100
8	PC LAB	20ACS10	Relational Database Management Systems Lab	0	0	3	1.5	40	60	100
9	SC	20ACM01	Web Application Development	1	0	2	2	40	60	100
10	MC	20AMB02	Universal Human Values-I	2	0	0	-	100	00	100
11	AC	20AHS11	Quantitative Aptitude and Reasoning-I	2	0	0	-	-	-	-
12	20ANSS1/ 20ANCC1		NSS/ NCC	0	0	2	-	-	-	-
TOTAL				**20**	**0**	**13**	**21.5**	**460**	**540**	**1000**

II B.Tech., II Semester

S.NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	*T*	P		CIA	SEE	Total
1	BS	20AHS13	Probability & Statistics	3	0	0	3	40	60	100
2	ES	20AHS14	Discrete Structures and Graph Theory	3	0	0	3	40	60	100
3	PC	20ACM02	Artificial Intelligence for Engineers	3	0	0	3	40	60	100
4	PC	20ACS13	Operating Systems	3	0	0	3	40	60	100
5	PC	20AIT04	Software Engineering	3	0	0	3	40	60	100
6	PC LAB	20ACM03	Artificial Intelligence Lab	0	0	3	1.5	40	60	100
7	PC LAB	20ACS15	Operating Systems Lab	0	0	3	1.5	40	60	100
8	PC LAB	20AIT05	Software Engineering Lab	0	0	3	1.5	40	60	100
9	SC	20ACD04	Data Analytics with R	1	0	2	2	40	60	100
10	AC	20AHS15	Quantitative Aptitude and Reasoning-II	2	0	0	-	-	-	-
TOTAL				**18**	**0**	**11**	**21.5**	**360**	**540**	**900**
Honor Degree hours distribution **4-0-0-4**										
Minor General Degree hours distribution **3-0-2-4** and Minor Industrial Relevant Track Degree hours distribution **4-0-0-4**										
Internship 2 Months (Mandatory) during summer vacation/Community Service Project(to be evaluated during III year I Sem)										

B.Tech. Honors in a Discipline CSE (AI & ML)

S. No.	Year & Sem	Course code	Course Name	Hours per week			Credits	PRE-REQUISITES	Scheme of Examination Max. Marks			Offered To
				L	T	P	C		CIA	SEE	Total	
POOL-I												
1	**II-II** (Any 1 Course from POOL-I)	20ACM41	Expert Systems	4	0	0	4	Artificial Intelligence for Engineers	40	60	100	CSE(AI&ML)
2		20ACM42	Analytical Bioinformatics	4	0	0	4	Artificial Intelligence for Engineers	40	60	100	CSE(AI&ML)
3		20ACM43	Applied Cryptography	4	0	0	4	Artificial Intelligence for Engineers	40	60	100	CSE(AI&ML)
4		20ACM44	Artificial Intelligence for Robotics	4	0	0	4	Artificial Intelligence for Engineers	40	60	100	CSE(AI&ML)
POOL-II												
1	**III-I** (Any 1 Course from POOL-II)	20ACM45	Business Intelligence	4	0	0	4	Expert Systems	40	60	100	CSE(AI&ML)
2		20ACM46	Drug Design System	4	0	0	4	Analytical Bioinformatics	40	60	100	CSE(AI&ML)
3		20ACM47	Network and Wireless Security	4	0	0	4	Applied Cryptography	40	60	100	CSE(AI&ML)
4		20ACM48	Robotic Vision & Control	4	0	0	4	Artificial Intelligence for Robotics	40	60	100	CSE(AI&ML)
POOL-III												
1	**III-II** (Any 1 Course from POOL-III)	20ACM49	Drone Technology	4	0	0	4	Business Intelligence	40	60	100	CSE(AI&ML)
2		20ACM50	Applied Deep Learning	4	0	0	4	Drug Design System	40	60	100	CSE(AI&ML)
3		20ACM51	Intrusion Detection and Prevention Systems	4	0	0	4	Network and Wireless Security	40	60	100	CSE(AI&ML)
4		20ACM52	Robot Operating Systems	4	0	0	4	Robotic Vision & Control	40	60	100	CSE(AI&ML)
POOL-IV												
1	**III-II** (Any 1 Course from POOL-IV)	20ACM53	Knowledge Representation	4	0	0	4	Drone Technology	40	60	100	CSE(AI&ML)
2		20ACM54	Clinical Information System	4	0	0	4	Applied Deep Learning	40	60	100	CSE(AI&ML)
3		20ACM55	Software Quality Control	4	0	0	4	Intrusion Detection and Prevention Systems	40	60	100	CSE(AI&ML)
4		20ACM56	Computer Aided Manufacturing	4	0	0	4	Robot Operating Systems	40	60	100	CSE(AI&ML)
POOL-V												

1	**IV-I** (Any 1 Course from POOL-V)	20ACM57	Deep Reinforcement Learning	4	0	0	4	Knowledge Representation	40	60	100	CSE(AI&ML)
2		20ACM58	DNA Sequencing	4	0	0	4	Clinical Information System	40	60	100	CSE(AI&ML)
3		20ACM59	Distributed System Security	4	0	0	4	Software Quality Control	40	60	100	CSE(AI&ML)
4		20ACM60	Industrial Automation & Robotics	4	0	0	4	Computer Aided Manufacturing	40	60	100	CSE(AI&ML)

NOTE: Students has to acquire 20 credits with minimum one subject from each pool @ 4 credits per subject.

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II B.Tech - I Semester (Common to All Branches)

L	T	P	C
3	-	-	3

20AHS10 - NUMERICAL METHODS

Course Outcomes:

After completion of the course the student will be able to:

1. **Analyze** the transcendental equations and solve those using different methods.
2. **Apply** numerical techniques to solve engineering problems.
3. **Analyze** the data using Correlation and regression to draw the valid conclusion.
4. **Apply** the solutions of ordinary differential equations and partial differential equations to real world problems.

UNIT-I

SOLUTION OF TRANSCENDENTAL EQUATIONS AND INTERPOLATION:

Introduction - Intermediate value theorem - The Bisection method - The method of false position - Newton - Raphson Method - Problems. **INTERPOLATION**: Forward Differences - backward differences-Newton's forward and backward differences formulae for interpolation –Problems on Interpolation - Lagrange's interpolation formula - Inverse interpolation - Problems.

UNIT-II

NUMERICAL DIFFERENTIATION AND INTEGRATION

Approximation of derivatives using interpolation polynomials-First and Second order derivatives – Problems on numerical differentiation. Newton Cotes formulae - Numerical integration using Trapezoidal rule, Simpson's $\frac{1}{3}$ rule and Simpson's $\frac{3}{8}$ Rule.

UNIT-III

CURVE FITTING:

Fitting of Curves by method of Least - squares – Fitting of Straight lines – Fitting of second degree Parabola-Fitting of the exponential curve- Fitting of the power curve – Problems –Regression-Correlation – Problems on interpretation of data – Drawing conclusions.

UNIT-IV

NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS

Taylor's series - Picard's method of successive Approximations - Euler's and Modified Euler's Method - Problems on single step methods - Runge - Kutta Methods – Predictor - corrector method - Milne's method.

UNIT-V

PARTIAL DIFFERENTIAL EQUATIONS:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Method of separation of variables - Solution of one dimensional wave equation, heat equation and two – dimensional Laplace's equation.

Text Books:

1. Dr.B.S.GREWAL, Higher Engineering Mathematics. Khanna publication Publications, 42th edition.
2. B.V.Ramana, A Text Book of Engineering Mathematics-I, TATA MC GRAWHILL
3. Jain.M.K, Iyengart.K.V,.Jain.R.K. Numerical Methods For Scientific And Engineering Computation. Newage International Publishers.(Text book)

References Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics. JOHN WILEY & SONS-2016.
2. N.Bail, M.Goyal&C.Walking, A Text Book Of Advanced Engineering Mathematics- A Computer Approach.
3. S.S. Sastry, Introductory Methods of Numerical Analysis, Printice Hall of India publications, 2012.

CO-PO's Mapping:

CO/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Average	**3**	**2.5**	**-**	**0.25**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Level of Correlation of the Course	**3**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

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II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
3	-	-	3

20ACS06 - COMPUTER ORGANIZATION AND ARCHITECTURE

Course Outcomes:

After Completion of the course the student will be able to:

1. Recognize the functionalities of computer architecture and its components.
2. Apply various basic algorithms and operations to solve complex arithmetic problems complying with IEEE standards.
3. Apply the concepts of memory management for analysis of system performance.
4. Identify the I/O components of computer architecture and their performance.
5. Describe pipelining mechanisms and recognize different parallel machine models.

UNIT I **7 hrs**

Introduction to computer systems - Overview of Organization and Architecture -Functional components of a computer -Registers and register files-Interconnection of components-Organization of the von Neumann machine and Harvard architecture-Performance of processor. Data representation, fixed and floating point and error detecting codes.

UNIT II **8 hrs**

Fundamentals of Computer Architecture: Introduction to ISA (Instruction Set Architecture)-Instruction formats- Instruction types and addressing modes- Instruction execution (Phases of instruction cycle)- Assembly language programming-Subroutine call and return mechanisms-Single cycle Data path design-Introduction to multi cycle data path-Multi cycle Instruction execution. Arithmetic micro operations, logic micro operations, shift micro operations, arithmetic logic shift unit.

UNIT III **8 hrs**

Micro programmed Control: Control memory, address sequencing, micro program example, and design of control unit. Computer Arithmetic: Fixed point representation of numbers-algorithms for arithmetic operations: multiplication (Booths, Modified Booths) - division (restoring and non-

restoring) - Floating point representation with IEEE standards and algorithms for common arithmetic operations- Representation of non-numeric data (character codes).

UNIT IV **9 hrs**

THE MEMORY SYSTEM: Memory systems hierarchy-Main memory organization-Types of Main memory-memory inter- leaving and its characteristics and performance- Cache memories: address mapping-line size- replacement and policies- coherence- Virtual memory systems- TLB-Reliability of memory systems- error detecting and error correcting systems.

INPUT/OUTPUT ORGANIZATION: I/O fundamentals: handshaking, buffering-I/O techniques: programmed I/O, interrupt-driven I/O, DMA- Interrupt structures: vectored and prioritized-interrupt overhead- Buses: Synchronous and asynchronous- Arbitration.

UNIT V **8 hrs**

Device Subsystems: Externa lst- RAID Levels- I/O Performance. Performance Enhancements: Classification of models - Flynn's taxonomy of parallel machine models (SISD, SIMD, MISD,MIMD)- Introduction to Pipelining- Pipelined data path-Introduction to hazards. Contemporary issues: Recent Trends: Multiprocessor architecture: Overview of Shared Memory architecture, Distributed architecture.

Text Books:

1. M. Morris Mano, Computer System Architecture, 3rdedition,PHI,India, 2006.
2. Carl Hamacher, ZvonksVranesic, SafeaZaky, Computer Organization, 5th edition, McGraw Hill, New Delhi,India,2010.

Reference Books:

1. William Stallings, Computer Organization and Architecture, designing for performance, 8 th edition, Prentice Hall, NewJersy, 2010.
2. Andrew S. Tanenbaum, Structured Computer Organization, 5th edition, Pearson Education Inc, NewJersy, 2006.
3. Sivarama P. Dandamudi, Fundamentals of Computer Organization and Design, Springer Int. Edition, USA, 2003.

CO-PO's mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	
CO2	2	3		3				3					3	
CO3	2	3											3	
CO4	3													
CO5	3													

3- High mapping **2-Medium Mapping** **1- Low Mapping**

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II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
3	-	-	3

20ACS07 - OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Outcomes:

After Completion of the course the student will be able to:

1. Demonstrate basic principles of OOP in java programming.
2. Apply the concepts of inheritance packages and interfaces in code reusability.
3. Apply the principles of exception handling in designing the customized exception to handle errors in application software.
4. Apply concepts of multithreading to solve problems in parallelism.
5. Apply concepts of Enumeration and Collections Framework in solving real time problems

UNIT-I **9 hrs**

Java History, Java Features, Object Oriented Features, Tokens-Constants, Identifiers, Keywords, Operators. Data types, type conversions, Statements-Expression, selection, Loop, Jump, Label and block statements. Arrays-one dimensional, two dimensional, String class, StringBuffer class, String Builder.

UNIT –II **8 hrs**

Fundamentals, declaring objects, object references, Methods, Constructors-default, parameterized constructors, garbage collection, this keyword. Method Overloading, constructor overloading, static, nested and inner classes, command-line arguments.

Inheritance- Basics, Creating multilevel hierarchy, using super, method overriding, dynamic method dispatch, abstract classes, using final in inheritance.

UNIT-III **6 hrs**

Packages-definition, class path, Access protection, importing packages.

Interfaces- definition, implementing interfaces, nested interfaces, variables and methods in interfaces, recent advances in interfaces, multiple inheritance using interfaces.

UNIT-IV **9 hrs**

Exception Handling: Fundamentals, Exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, chained exceptions, custom exceptions.

Multithreading: Thread life cycle, Java Thread Model, Main thread, creation of child thread, creation of multiple child threads, isAlive(),join(), wait(),notify(),notifyAll(), synchronization, inter thread communication.

UNIT- V **9 hrs**

Enumerations, Wrapper classes, auto boxing, annotations.

Lambda expressions-introduction, Block lambda expressions, Generic functional interfaces, passing lambda expressions as arguments, lambda expressions and exceptions, lambda expressions and variable capture. Collections Framework: Collection interfaces and classes. Iterators, split Iterators, Map, comparators, Arrays, String tokenizer, Bitsets, Random, Scanner class.

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.
2. Core Java Volume – 1 Fundamentals, Cay S. Horstmann, Pearson Education.
3. Java Programming for core and advanced learners, Sagayaraj, Dennis, Karthik and Gajalakshmi, University Press
4. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
5. Object Oriented Programming through Java, P. Radha Krishna, and University Press.
6. Programming in Java, S. Malhotra, S. Chaudhary, 2nd edition, Oxford Univ. Press.
7. Java Programming and Object-oriented Application Development, R.A. Johnson, Cengage Learning.

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3												3		
CO 2	3	3											3		
CO 3	2	3	3	3									3		
CO 4	3	3		3										3	

CO 5	**2**	**3**		**3**										**2**	

3- High mapping **2-Medium Mapping** **1- Low Mapping**

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(Autonomous)

II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	**T**	**P**	**C**
3	**-**	**-**	**3**

20AIT01 - AUTOMATA AND COMPILER DESIGN

Course Outcomes:

At the end of the course the student will be able to:

1. Demonstrate knowledge to represent the different programming language constructs (keywords, expressions, statement) in the machine understandable language by using the basic tools (REs, Automata) of automata theory.
2. Analyze various intermediate forms of source programs.
3. Apply the code optimization techniques in the generation of code for a given real time problem.

UNIT-I

COMPILER, FORMAL LANGUAGE, REGULAR EXPRESSIONS:

Introduction, Phases of Compiler, Specification of Token, Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA, Conversion of regular expression to NFA, NFA to DFA.

UNIT-II

CONTEXT FREE GRAMMARS AND GRAMMAR PARSING:

Context free grammars, derivation, parse trees, ambiguity LL (K) grammars and LL (1) parsing. Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.

UNIT-III

SEMANTICS, RUN TIME STORAGE MANAGEMENT:

Syntax directed translation, S-attributed and L-attributed grammars, Chomsky hierarchy of languages and recognizers, Type checking, type conversions, equivalence of type expressions,

overloading of functions and operations. Storage organization, storage allocation strategies, scope access to non-local names, parameter passing, and language facilities for dynamics storage allocation.

UNIT-IV

INTERMEDIATE CODE GENERATION

Intermediate code – abstract syntax tree, translation of simple statements and control flow statements, Back patching, procedure calls.

UNIT-V

CODE OPTIMIZATION AND CODE GENERATION:

Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs. Machine dependent code generation, Issues in the design of code generation, object code forms, generic code generation algorithm, Register allocation and assignment. DAG representation of Basic Blocks.

Text Books:

1. Compilers Principles, Techniques and Tools, Alfred V.Aho and Jeffrey D.Ullman, Ravi sethi, Pearson Education.

Reference Books:

1. Modern Compiler Construction in C, Andrew W. Appel., Cambridge University Press.
2. Theory of Computation, S. Balakrishnan and V.D. Ambeth Kumar, ACME Learning Publisher, New Delhi.
3. Principles of Compiler Design 3rd Edition, Balakrishnan S, Sai Publishers.

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	1									2	1	2	
CO 2	3	2	3										3		
CO 3	2		2									2	1	3	

3- High mapping **2-Medium Mapping** **1- Low Mapping**

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L	T	P	C
3	-	-	3

20ACS08 - RELATIONAL DATABASE MANAGEMENT SYSTEMS

Course Outcomes:

At the end of the course the student will be able to:

1. Demonstrate the basic elements of a relational database management system.
2. Design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries.
3. Apply the concepts of ER-modelling and normalization to design practical data models
4. Analyze transaction processing, concurrency control and storage methods for database management.

UNIT –I **8 hrs**

Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. Overview of Database Languages and Architectures: Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. Conceptual Data Modelling using Entities and Relationships: Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples, Specialization and Generalization.

UNIT-II **9 hrs**

Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. Relational Algebra: Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping. SQL: SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

UNIT-III **9 hrs**

SQL: Advances Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL. Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT-IV **9 hrs**

Normalization Algorithms: Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms.

Transactions: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Concurrency: Concurrency control, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT-V **8 hrs**

Indexing And Hashing: File Organization, Organization of Records in Files, Ordered Indices, B+ Tree Index Files, B,Tree Index Files, Multiple Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.

Text Books:

1. Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, 7th Edition, 2017, Pearson.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006.

Reference Books:

1. Ivan Bayross,”SQL, PL/SQL programming language of Oracle”, BPB Publications 4th edition, 2010.
2. Raghurama Krishnan, Johannes Gehrke, “Data base Management Systems”, TATA McGraw,Hill 3rd Edition,2007.
3. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.

4. S.K.Singh, “Database Systems Concepts, Design and Applications”, First edition, Pearson Education, 2006.

CO-PO’s Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2										3		
CO 2	3	2	3		3								3		
CO 3	2	2	3										3	2	
CO 4	3	3											3		

3- High mapping 2-Medium Mapping 1- Low Mapping

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II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
-	-	3	1.5

20ACS09 – OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Course Outcomes:

At the end of the course the student will be able to:

1. Apply syntactic constructs of JAVA to solve engineering problems.
2. Solve real time problems using interfaces, packages, Exception Handling, Collection Framework and Multithreading.
3. Work independently and in team to solve competitive problems.

Week-1:

Write a Java program that prints all real solutions to the quadratic equation ax2+ bx + c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2-4ac is negative, display a message stating that there are no real solutions.

The Fibonacci sequence is defined by the following rule: The fir two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses recursive functions to print the nth value in the Fibonacci sequence

Write a Java program that uses non-recursive functions to print the nth value in the Fibonacci sequence

Week-2:

a) Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.

b) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java. util)

Week-3:

a) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.

b) Write a Java program for sorting a given list of names in ascending order. c) Write a Java program to make frequency count of words in a given text.

Week-4:

a) Write a Java program that reads a file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.

c) Write a Java program that displays the number of characters, lines and words in a text file.

Week-5:

a) Write a Java program that creates three threads. First thread displays ―Good Morning‖ every one second, the second thread displays ―Hello‖ every two seconds and the third thread displays ―Welcome‖ every three seconds.

b) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.

Week 6

a) Write a java program to create an abstract class named Shape that contains an empty method named number of Sides ( ).Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains.

Week 7

a) Write a java program to implement interface using lambda expressions.

b) Write a Java Program to implement comparator using lambda expressions.

c) Write a Java Program to illustrate the iteration of enumeration elements.

Week 8

Create an enumeration called Players that have some names and runs scored. Create a constructor and a method that will return the number of runs scored by each player or enumerator or enum constant. Using values () method to iterate the enumerator and display the number of runs scored by each player.

Week 9

In a given string, find the first non-repeating character .You are given a string, that can contain repeating characters. Your task is to return the first character in this string that does not repeat. i.e.,

occurs exactly once. The string will contain characters only from English alphabet set, i.e., ('A' - 'Z') and ('a' - 'z'). If there is no non-repeating character print the first character of string.

Week 10

Practice sessions on HackerRank and HackerEarth

Example: HackerEarth –jumble letter, missing alphabets

HackerRank -bear and steady gene, super reduced string, gemstones

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	3									3		
CO 2	3	3	3	3									3		
CO 3	3	3	3	3					3			3			

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)
II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
-	-	3	1.5

20AIT02 - AUTOMATA AND COMPILER DESIGN LAB

Course Outcomes:

At the end of the course the student will be able to:

1. Define the role of lexical analyzer, use of regular expressions and transition diagrams.
2. Analyze the working of lex and yacc compiler for debugging of programs.
3. Demonstrate the working of compiler at various stages
4. Demonstrate the working nature of compiler tools.

List of Experiments:

1. Write a C Program to implement NFAs that recognize identifiers, constants, and operators of the mini language.
2. Write a C Program to implement DFAs that recognize identifiers, constants, and operators of the mini language.
3. Design a Lexical analyzer for the given language. The lexical analyzer should ignore redundant spaces, tabs and newlines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.
4. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating tools.
5. Recognition of a valid variable which starts with a letter and followed by any number of letters or Digits.
6. Design Predictive parser for the given language.
7. Design LALR bottom up parser for the given language.
8. Implementation of the symbol table.
9. Implementation of type checking.
10. Implementation of Dynamic Memory Allocation (Stack, Heap, Static)
11. Construction of a DAG (Directed Acyclic Graph)

12. Implementation of the Backend of the Compiler.

Text Books:

1. Introduction to Theory of computation, Sipser, 2nd Edition, Thomson.
2. Compilers Principles, Techniques and Tools Aho , Ullman, ravisethi, Pearson Education

Reference Books:

1. Modern Compiler construction in C, Andrew W.Appel Cambridge University Press. Compiler Construction, LOUDEN, Cengage Learning.

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2											3		
CO 2	3	3			2								3		
CO 3	3												2		
CO 4	3				2								2		

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
-	-	3	1.5

20ACS10 - RELATIONAL DATABASE MANAGEMENT SYSTEMS LAB

Course Outcomes:

At the end of the course the student will be able to:

1. Design and implement a database schema for given problem.
2. Implement SQL queries using query language tools.
3. Apply the normalization techniques for development of application software to realistic problems.
4. Formulate queries using SQL tools for DML/DDL/DCL commands.

LIST OF EXPERIMENTS

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, EXCEPT operators.. Example:, Select the roll number and name of the student who secured fourth rank in the class.

3. Using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING, Creation and dropping of Views.

4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

5. i) Creation of simple PL/SQL program which includes declaration section, executable section and exception –handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found) ii) Implement COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

6. Develop a program that includes the features NESTED IF, CASE and CASE expression.

7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions.

8. Program development using a creation of procedures, passing parameters IN and OUT of PROCEDURES.

9. Program development using the creation of stored functions, invoke functions in SQL Statements and write complex functions.

10. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.

11. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

12. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers.

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	3										3		
CO 2	3	3			3								3		
CO 3	3	3											3		
CO 4	3	3			3							2	3		

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

II B.Tech I Semester (Common to CSE (AI &ML))

L	T	P	C
1	-	2	2

20ACM03 WEB APPLICATION DEVELOPMENT

Course Outcomes:

At the end of the course the student will be able to:

1. Understand the fundament concepts of HTML, CSS, JavaScript for web development.
2. Recognize the concepts of responsive web development using the bootstrap framework.
3. Use JQuery Java script library to create interactive websites.
4. Apply Google Charts for better data visualization in website design

UNIT I:

HTML: What is a browser? What is HTML?, Elements and Tags, Basic HTML5 structure, Metadata, <title>, Adding favicon, Comments, headings.

Task 1: Create a Basic HTML document

Block-Level Elements & Inline Elements, Links (Understand Absolute vs Relative paths), Lists, Images, iframe (embed youtube video).

Task 2: Create your Profile Page

UNIT II:

Tables: <table>, <tr>, <th>, <td>, Attributes for each Table element

Task 3: Create a Class Timetable (to merge rows/columns, use rowspan/colspan)

Form Elements: <input>, <select>, <textarea>, <button>, Attributes for each Form element

Task 4: Create a Student Hostel Application Form

UNIT III:

Cascading Style Sheets (CSS): CSS Properties, Types of CSS, Selectors, box model, Pseudo-elements, z-index

Task 5: Make the Hostel Application Form designed in Unit -2 beautiful using CSS (add colors, backgrounds, change font properties, borders, etc.)

UNIT IV:

Bootstrap - CSS Framework: Layouts (Containers, Grid system), Forms, Other Components

Task 6: Style the Hostel Application Form designed in Unit -3 still more beautiful using Bootstrap CSS (Re-size browser and check how the webpage displays in mobile resolution)

UNIT V:

HTTP & Browser Developer Tools: Understand HTTP Headers (Request & Response Headers), URL & its Anatomy, Developer Tools: Elements/Inspector, Console, Network, Sources, performance, Application Storage.

Task 7: Analyse various HTTP requests (initiators, timing diagrams, responses) and identify problems if any.

Course Outcomes:

After Completion of the course the student will be able to

1. Construct web sites with valid HTML, CSS.
2. Create responsive Web designs that work on phones, tablets, or traditional laptops and wide screen monitors.

Online Courses & References:

1. Deitel and Deitel and Nieto, ―Internet and World Wide Web - How to Program,Prentice Hall, 5th Edition, 2011.
2. Web Technologies, Uttam K. Roy, Oxford Higher Education., 1st edition, 10th impression, 2015.
3. HTML: https://html.spec.whatwg.org/multipage/
4. HTML: https://developer.mozilla.org/enUS/docs/Glossary/HTML5
5. CSS: https://www.w3.org/Style/CSS/
6. Bootstrap - CSS Framework: https://getbootstrap.com/
7. Browser Developer Tools: https://developer.mozilla.org/en-
8. US/docs/Learn/Common_questions/What_are_browser_developer_tools

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	3								3	
CO2	3	1	3		3								3	
CO3	3		3		3								-	
CO4	3	2			3								3	

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – I Semester (EEE, ECE, CSE)

L	T	P	C
2	-	-	-

20AMB02 - UNIVERSAL HUMAN VALUES-I
(Mandatory course)

Course Outcomes:

After completion of the course students will be able to

1. Apply the principles of natural acceptance to design a happy and prosperous living with responsibility.
2. Analyse the elements of sentient 'I' and material human body to design a living with responsibility for happiness and prosperity.
3. Apply the principles of 'trust' and 'respect' for designing a society with universal human order.
4. Analyse the situations causing imbalance in nature and further design an ecosystem for peaceful co-existence.
5. Apply the principles of science technology and management to solve contemporary problems professionally and ethically.

UNIT – I: **Introduction - Need, Basic Guidelines, Content and Process for Value Education**

Purpose and motivation for the course, recapitulation from Universal Human Values-I; Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration; Continuous Happiness and Prosperity- A look at basic Human Aspirations; Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment ofaspirations of every human being with their correct priority; Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario; Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT – II: Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material Body; Understanding the needs of Self ('I') and 'Body' - happiness and physical facility; Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer); Understanding the characteristics and activities of 'I' and harmony in 'I'; Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail; Programs to ensure Sanyam and Health.

UNIT – III: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship; Understanding the meaning of Trust; Difference between

intention and competence; Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship; Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals; Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

UNIT – IV: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

Understanding the harmony in the Nature; Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature; Understanding Existence as Co-existence of mutually interacting units in all- pervasive space;Holistic perception of harmony at all levels of existence

UNIT – V: Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values; Definitiveness of Ethical Human Conduct; Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

Strategy for transition from the present state to Universal Human Order:

a. At the level of individual: as socially and ecologically responsible engineers, technologists andmanagers
b. At the level of society: as mutually enriching institutions and organizations.

Textbooks:

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values andProfessional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2.

Reference Books:

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.The Story of Stuff (Book).
3. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth" E. FSchumacher. "Small is Beautiful"Slow is Beautiful –Cecile Andrews J C Kumarappa "Economy of Permanence" Pandit Sunderlal "Bharat Mein Angreji Raj" Dharampal.
4. Rediscovering India. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"India Wins Freedom - Maulana Abdul Kalam Azad Vivekananda - Romain Rolland (English)Gandhi - Romain Rolland (English).

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B. Tech - I Semester (Common to All Branches)

20AHS11 - Quantitative Aptitude and Reasoning-I
(Audit course)

L	P	T	C
2	-	-	-

UNIT 1: QUANTITATIVE ABILITY - I

Vedic Maths – Square - Square root – Cube - Cube root – Fractions – Mathematical operations – Number System – Types of numbers - Divisibility Rule – Unit Digit – Factors and Factorials – Remainder Theorem – Factorization and Trailing Zeroes – LCM And HCF

UNIT 2: QUANTITATIVE ABILITY - II

Arithmetic Progression – Common Difference- Nth Term – Sum of terms – Geometric Progression – Common Ratio – Nth term – Sum of Terms – Averages - Weighted average – Percentages – Conversion – Increasing and Decreasing in quantity – Change in Percentage – Successive discount – Compound Growth

UNIT 3: REASONING ABILITY I

Coding and Decoding – Blood Relations – Directions – Number Series and Letter Series – Ranking and Ordering

UNIT 4: VERBAL I

Verbal analogy - Types - Parts of Speech – Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction and Interjection - Prepositions –Preposition of Place, Preposition of Placement, Preposition of Time and Preposition of Duration - Articles – Usage of a, an, the, Omission of articles - Sentences - Pattern and Types.

UNIT 5: SOFT SKILL I

Communication Skills - Self-Confidence - Introductions & Greetings - Presentation Skills - Self-Motivation

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B. Tech - II Semester (Common to CE, ME, CSE, CSM & IT)

L	T	P	C
3	0	0	3

20AHS13 PROBABILITY AND STATISTICS

Course Outcomes:

After completion of the course the student will be able to

1. Apply probability distributions to real life problems.
2. Analyze inference theory to make wise decisions about a population parameter.
3. Apply sampling methods in the day-to-day practical life to assess the quality of commodities.
4. Apply the testing of hypothesis for large and small samples.

UNIT-I
RANDOM VARIABLES & THEORITICAL DISTRIBUTIONS:

Introduction on Probability - Discrete and Continuous random variables – Distribution functions – Moment generating functions. Binomial distribution – Poisson distribution – Normal distribution – related properties.

UNIT-II
SAMPLING DISTRIBUTIONS & ESTIMATION:

Population - Sample - Parameter and Statistic -Characteristics of a good estimator - Consistency– Invariance property of Consistent estimator - Sufficient condition for consistency- Unbiasedness – Sampling distributions of means (known and unknown)- sums and difference. Estimation- Estimator, Estimate, Point estimation – Interval estimation – Bayesian estimation.

UNIT-III

TEST OF HYPOTHESIS:

Null Hypothesis-Alternative hypothesis-Critical region – Level of Significance-Type I error and Type II errors-One tail test -Two tail tests - Hypothesis concerning one and two means – Hypothesis concerning one and two proportions.

UNIT-IV

TEST OF SIGNIFICANCE: Student's t-test, test for a population mean, equality of two population means, paired t-test, F-test for equality of two population variances, χ^2 -Chi-square test for goodness of fit and test for attributes.

ANALYSIS OF VARIANCE - One way and two-way classifications.

UNIT-V

QUEUING THEORY: Introduction - Queues with impatient customers: Balking and reneging-Classification, stationary process, Binomial process, Poisson process, Birth and

Text Books:

1. Miller and John Freund. E, Probability & Statistics for Engineers, New Delhi, Pearson Education, 2014.
2. S.P.Gupta,Statistical Methods,33rdEdition,publications SultanChand& Sons.2021.
3. Iyengar, T.K.V., Krishna Gandhi B., Probability & Statistics, New Delhi, S. Chand & Company, 2014.

References Books:

1. Arnold O Allen, Probability & Statistics, Academic Press. 2014.
2. Manoj Kumar Srivastava and Namita Srivastava, Statistical InferenceTesting of Hypotheses,Prentice Hallof India,2014.

CO-PO's Mapping:

CO/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**2**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Average	**2.5**	**3**	**-**	**0.25**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Level of Correlation of the Course	**3**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech, II Semester (Common to CSE, CSD, CSM &IT)	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

20AHS14 DISCRETE STRUCTURES & GRAPH THEORY

Course Outcomes:

After Completion of the course the student will be able to

1. Apply the rules of inference to determine the validity of argument.
2. Apply lattice theory and Boolean algebra in theory and design of computers.
3. Apply generating functions to solve the combinatorial problems which makes easier to solve broad spectrum of problems.
4. Apply the graph theory and trees in describing structures involving hierarchy. Also used in switching and logical design.

UNIT-I:

MATHEMATICAL LOGIC AND PREDICATES: Statements and notations, Connectives, Well -formed formulas, Truth Tables, tautology, equivalence implication, Normal forms.

Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof by contradiction.

UNIT-II:

SET THEORY AND BOOLEAN ALGEBRA: Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram. Functions: Inverse Function Compositions of functions, Lattice and its Properties. Introduction to Boolean Algebra- Sub Algebra, Direct product and homomorphism.

UNIT-III:

ELEMENTARY COMBINATORICS: Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion.

UNIT- IV:

RECURRENCE RELATION: Generating Functions, Sequences, Calculating Coefficient of generating functions, Recurrence relations. Solving recurrence relation by substitution. Generating

functions and Characteristic equations (both homogeneous and non-homogeneous Recurrence Relation).

UNIT-V:

GRAPH THEORY: Representation of Graph, Directed Graph, Sub graphs, Isomorphism of Graphs, Planar Graphs, Connected Graphs, Euler and Hamiltonian circuits and their necessary and sufficient conditions for existence of Euler Circuits and Hamiltonian Circuits. (without Proof). Trees, Spanning and minimal spanning Trees, Prim's and Kruskal algorithm. Searching Algorithms of Trees - DFS, BFS.

Text Books:

1. Trembly J.P. &Manoha. P, Discrete Mathematical Structures with applications to computer science TMH. 2017.
2. Dr D.S. Chandrasekhara, Mathematical Foundations of computer science Prism books Pvt Ltd.2012.

Reference Books:

1.Bernand Kolman, Roberty C. Busby, Sharn Cutter, Discrete Mathematical Structures, Ross, Pearson Education/PHI. 2013

2. Mallik and Sen, Discrete Mathematical Structures, Thomson. 2004.

3. J.L. Mott, A. Kandel, T.P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians Prentice Hall, 1986.

CO-PO's Mapping:

CO/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Average	**3**	**2.5**	**-**	**0.25**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Level of Correlation of the Course	**3**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

II B.Tech II Semester (CSE (AI&ML))

L	T	P	C
3	-	-	3

20ACM02 ARTIFICIAL INTELLIGENCE FOR ENGINEERS

Course Outcomes:

After Completion of the course the student will be able to

1. Summarize and formulate appropriate logic concepts and AI methods for solving a problem.
2. Apply various searching, game playing, and knowledge representation techniques to solve the real world problems.
3. Analyze different expert systems and its applications.
4. Explain the concepts of probability theory.

UNIT I: 9 hrs.

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends in AI.

Problem solving: state – space search and control strategies: Introduction, general problem Solving characteristics of problem.

UNIT II: 9 hrs.

Search Strategies: exhaustive searches, heuristic search techniques: A* Algorithm and Hill Climbing, constraint satisfaction.

Problem reduction and game playing: Introduction, problem reduction, game playing,alpha -beta pruning.

UNIT III: 9 hrs.

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

UNIT IV: 9 hrs.

Knowledge representation: Introduction, approaches to knowledge representation, knowledge Representation using semantic network, extended semantic networks for KR, knowledge representation using frames.

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory.

UNIT V: 9 hrs.

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule- based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools.

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster- shafer theory, Case Study.

Text Books:

1. Artificial Intelligence by Saroj Kaushik, CENGAGE Learning.
2. Artificial intelligence, A modern Approach, by Stuart Russel and Peter Norvig Second Edition, PEA.
3. Artificial Intelligence by Rich, Kevin Knight, Shiv Shankar B Nair, 3rd edition, TMH.
4. Introduction to Artificial Intelligence by Patterson, PHI.

Reference Books:

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA.
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer.
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier.

Online Courses:

1. NPTEL Course: Fundamentals of Artificial Intelligence
https://nptel.ac.in/courses/112/103/112103280/
2. NPTEL Course: Introduction to Artificial Intelligence
https://nptel.ac.in/courses/106/102/106102220/

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	3	-	-	-	-	-	-	3	3	2	1
CO2	3	2	-	-	3	-	-	-	-	-	-	2	3	2	1
CO3	3	2	-	3	-	-	-	-	-	-	-	3	3	2	1
CO4	3	3	-	-	3	-	-	-	-	-	-	3	3	2	-

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech II Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
3	-	-	3

20ACS13 OPERATING SYSTEMS

Course Outcomes:

After Completion of the course the student will be able to

1. Apply the knowledge of operating system fundamental concepts to manage the computer resources.
2. Evaluate the performance of scheduling algorithms which is best suited in a multiprogramming environment.
3. Develop an algorithm to check the resources are effectively used in an operating system's component in a shared environment
4. Analyze an operating system's components to manage the user data.

UNIT I

INTRODUCTION TO OS **8hrs**

Functionality of OS - OS Design issues - Structuring methods (monolithic, layered, modular, micro-kernel models) Overview of computer operating systems, protection and security, distributed systems, special purpose systems, operating systems structures: operating system services and systems calls, system programs, operating system structure, operating systems generation.

UNIT II

SCHEDULING **8hrs**

Process concepts, Cooperating processes, Inter process communication. Threads: Overview, Multithreading models, PThreads. CPU Scheduling: Basic concepts, Scheduling criteria, Algorithms, and their evaluation.

UNIT III

PROCESS SYNCHRONIZATION & DEADLOCK **8hrs**

Process synchronization, The critical-section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, atomic transactions. Deadlocks: System model, deadlock characterization, Methods for handling deadlock, deadlock prevention, detection and avoidance, recovery form deadlock.

UNIT IV 7hrs

MEMORY MANAGEMENT STRATEGIES

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory: demand paging, page replacement, algorithms, allocation of frames, Thrashing case studies UNIX, Linux, Windows 100

UNIT V 8hrs

FILE SYSTEM INTERFACE

File concepts, Access Methods, Directory structure, File system mounting, File sharing, protection. File System implementation: File system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance, Mass-storage structure: Disk structure, disk scheduling, disk management, swap-space management and disk attachment.

Text Books:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne-Operating System Concepts, Wiley (2012).

Reference Books:

1. RamezElmasri, A Carrick, David Levine, Operating Systems, A Spiral Approach - McGrawHill Science Engineering Math (2009).

CO-PO's Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1										3	3
CO2	3	3	2	3	1								3	3
CO3	3	2	1										3	3
CO4	3	2											3	3

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML)

L	T	P	C
3	-	-	3

20AIT04 SOFTWARE ENGINEERING

Course Objectives:

The objectives of this course are to

1. Analyse basic concepts of software engineering and life cycle models.
2. Explore the issues in software requirements specification and enable to write SRS documents for software development problems.
3. Elucidate the basic concepts of software design and enable to carry out procedural and object oriented design of software development problems.
4. Understand the basic concepts of black box and white box software testing and enable to design test cases for unit, integration, and system testing.
5. Reveal the basic concepts in software project management.

UNIT - I

BASIC CONCEPTS IN SOFTWARE ENGINEERING AND SOFTWARE PROJECT MANAGEMENT: Basic concepts: abstraction versus decomposition, evolution of software engineering techniques, Software development life cycle (SDLC) models: Iterative waterfall model, Prototype model, Evolutionary model, Spiral model, RAD model, Agile models, software project management: project planning, project estimation, COCOMO, Halstead's Software Science, project scheduling, staffing, Organization and team structure, risk management, configuration management.

UNIT - II

REQUIREMENTS ANALYSIS AND SPECIFICATION: The nature of software, The Unique nature of Webapps, Software Myths, Requirements gathering and analysis, software requirements specification, Traceability, Characteristics of a Good SRS Document, IEEE 830 guidelines, representing complex requirements using decision tables and decision trees, overview of formal system development techniques, axiomatic specification, algebraic specification.

UNIT -III

SOFTWARE DESIGN : Good Software Design, Cohesion and coupling, Control Hierarchy: Layering, Control Abstraction, Depth and width, Fan-out, Fan-in, Software design approaches, object oriented vs. function oriented design. Overview of SA/SD methodology, structured analysis,

Data flow diagram, Extending DFD technique to real life systems, Basic Object oriented concepts, UML Diagrams, Structured design, Detailed design, Design review, Characteristics of a good user interface, User Guidance and Online Help, Mode-based vs Mode-less Interface, Types of user interfaces, Component-based GUI development, User interface design methodology: GUI design methodology

UNIT - IV

CODING AND TESTING: Coding standards and guidelines, code review, software documentation, Testing, Black Box Testing, White Box Testing, debugging, integration testing, Program Analysis Tools, system testing, performance testing, regression testing, Testing Object Oriented Programs.

UNIT-V

SOFTWARE QUALITY, RELIABILITY, AND OTHER ISSUES: Software reliability, Statistical testing, Software quality and management, ISO 9000, SEI capability maturity model (CMM), Personal software process (PSP), Six sigma, Software quality metrics, CASE and its scope, CASE environment, CASE support in software life cycle, Characteristics of software maintenance, Software reverse engineering, Software maintenance processes model, Estimation maintenance cost. Basic issues in any reuse program, Reuse approach, Reuse at organization level.

Course Outcomes:

At the end of the course the student will be able to:

1. Design software requirements specifications for given problems.
2. Implement structure, object oriented analysis and design for given problems.
3. Design test cases for given problems.
4. Apply quality management concepts at the application level

Text Books:

1. Rajib Mall, “Fundamentals of Software Engineering”, 5th Edition, PHI, 2018.
2. Pressman R, “Software Engineering- Practioner Approach”, McGraw Hill.

Reference Books:

1. Somerville, “Software Engineering”, Pearson 2.
2. Richard Fairley, “Software Engineering Concepts”, Tata McGraw Hill.
3. JalotePankaj, “An integrated approach to Software Engineering”, Narosa

Online Learning Resources:

1. https://nptel.ac.in/courses/106/105/106105182/
2. http://peterindia.net/SoftwareDevelopment.html

CO-PO’s Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**2**	**1**										**3**	**3**
CO2	**3**	**3**	**2**	**3**	**1**								**3**	**3**
CO3	**3**	**2**	**1**										**3**	**3**
CO4	**3**	**2**											**3**	**3**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

II B.Tech II Semester (CSE (AI &ML))

L	T	P	C
-	-	3	1.5

20ACM03 ARTIFICIAL INTELLIGENCE LAB

Course Outcomes:

After Completion of the course the student will be able to

1. Implement search algorithms.
2. Apply appropriate logic concepts and AI methods for solving a problem.
3. Implement game playing techniques
4. Design Chabot and virtual assistant

Experiments:

1. Write a program to implement Breadth First Search Traversal.
2. Write a program to implement Depth First Search Traversal.
3. Write a program to implement Water Jug Problem.
4. Write a program to find the solution for traveling salesman Problem.
5. Write a program to implement 8 puzzle problem.
6. Write a program to implement Towers of Hanoi problem.
7. Write a program to implement A* Algorithm
8. Write a program to implement Hill Climbing Algorithm
9. Write program to implement simple Chatbot.
10. Build a bot that provides all the information related to your college.
11. Write a program to sort the sentence in alphabetical order.
12. Write a program to implement Tic-Tac-Toe game.

Text Books:

1. E. Rich and K. Knight, Artificial Intelligence: a Modern Approach, Pearson.
2. N. J. Nilsson, Principles of Artificial Intelligence, Narosa.

Reference Books:

1. Artificial Intelligence with Python by Prateek Joshi, Packt.
2. Artificial Intelligence with Python Cookbook by Ben Auffarth, Packt.
3. Artificial Intelligence with Python, By Alberto Artasanchez, Prateek Josh,2nd ed,Packt.

ONLINE LEARNING RESOURCES/VIRTUAL LABS:

1. https://www.tensorflow.org/
2. https://pytorch.org/
3. https://github.com/pytorch
4. https://keras.io/
5. https://github.com/keras-team
6. http://deeplearning.net/software/theano/
7. https://github.com/Theano/Theano
8. https://caffe2.ai/
9. https://github.com/caffe2
10. https://deeplearning4j.org/Scikit-learn:https://scikit-learn.org/stable/
11. https://github.com/scikit-learn/scikit-learn
12. https://www.deeplearning.ai/
13. https://opencv.org/
14. https://github.com/qqwweee/keras-yolo3
15. https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/
16. https://developer.nvidia.com/cuda-math-library

MAPPING OF COS TO POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	-	-	-	-	-	3	-	3	-
CO2	3	3	2	-	-	-	-	-	-	-	-	3	3	2	-
CO3	3	3	2	-	-	-	-	-	-	-	-	2	-	3	-
CO4	3	-	-	-	-	-	-	-	-	-	-	3	3	2	-

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech II Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
-	-	3	1.5

20ACS15 OPERATING SYSTEMS LAB

Course Outcome:

At the end of the course the student will be able to:

1. Execute the basic command in UNIX operating system and shell program.
2. Simulate the principles of CPU scheduling concepts.
3. Simulate the principles of synchronization and contiguous memory allocation technique.
4. Simulate the principle of page replacement algorithm
5. Simulate the concepts of disk scheduling algorithm

LIST OF EXPERIMENTS

1. Explain the following system calls in UNIX operating system (fork, exec, mkdir, cat, open, date, history, clear, pwd, ls, cd)
2. Write a shell script program
   (a) To perform arithmetic operations.
   (b) To find the given number is odd or even
3. Implement the various process scheduling mechanisms such as FCFS, SJF, Priority, round – robin.
4. Implement the solution for reader – writer's problem.
5. Implement the solution for dining philosopher's problem.
6. Implement banker's algorithm.
7. Implement the first fit; best fit and worst fit file allocation strategy.
8. Write a C program to simulate page replacement algorithms a) FIFO b) LRU c) LFU
9. Write a C program to simulate disk scheduling algorithm a)FIFO b)SCAN c)CSCAN

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1										3	3
CO2	3	3	2	3	1								3	3
CO3	3	2	1										3	3
CO4	3	2											3	3

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B.Tech II Semester (Common to CSE, IT, CSE (DS) & CSE(AI &ML)	**L**	**T**	**P**	**C**
	-	**-**	**3**	**1.5**

20AIT05 SOFTWARE ENGINEERING LAB

Course Outcomes:

At the end of the course the student will be able to:

1. Acquaint with historical and modern software methodologies
2. Understand the phases of software projects and practice the activities of each phase
3. Practice clean coding
4. Take part in project management
5. Adopt skills such as distributed

List of Experiments:

1. Draw the Work Breakdown Structure for the system to be automated
2. Schedule all the activities and sub-activities Using the PERT/CPM charts
3. Define use cases and represent them in use-case document for all the stakeholders of the system to be automated
4. Identify and analyze all the possible risks and its risk mitigation plan for the system to be automated
5. Diagnose any risk using Ishikawa Diagram (Can be called as Fish Bone Diagram or Cause& Effect Diagram)
6. Define Complete Project plan for the system to be automated using Microsoft Project Tool
7. Define the Features, Vision, Business objectives, Business rules and stakeholders in the vision document
8. Define the functional and non-functional requirements of the system to be automated by using Use cases and document in SRS document
9. Develop a tool which can be used for quantification of all the non-functional requirements
10. Write C/Java/Python program for classifying the various types of coupling.
11. Write a C/Java/Python program for classifying the various types of cohesion.
12. Write a C/Java/Python program for object oriented metrics for design proposed by Chidamber and Kremer. (Popularly called CK metrics)
13. Draw a complete class diagram and object diagrams using Rational tools

References:

1. Software Engineering? A Practitioner‟ s Approach, Roger S. Pressman, 1996, MGH.
2. Software Engineering by Ian Sommerville, Pearson Edu, 5th edition, 1999
3. An Integrated Approach to software engineering by Pankaj Jalote , 1991 Narosa

Online Learning Resources/Virtual Labs:

http://vlabs.iitkgp.ac.in/se/

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester (Common to CSE, CSE (DS), CSE (AIML))

	L	T	P	C
Code: 20ACD04	**1**	**0**	**2**	**2**

DATA ANALYTICS WITH R

course outcome:

1. Apply the knowledge of basic programming and execute R program using supported functionalities to solve real time applications.
2. Apply the knowledge of pre-processing techniques, to transform variables to facilitate analysis.
3. Design an effective model which enhance the prediction accuracy
4. To apply the knowledge of visualization technique to interpret the analysed data

UNIT I

GETTING STARTED WITH R

Introduction to R, R Language Fundamentals: Introduction, Data structures, Managing your R session, Language basics, Subscripting and subsetting, Vectorized computations, Functional programming, Writing functions.

UNIT II

DATA WRANGLING

Data Ingestion, Data Review, Data Cleaning, Variable roles, Feature selection, Missing data.

UNIT III

DATA VISUALIZATION

Data visualization with ggplot2, Preparing the dataset, Scatter plot, Bar Chart, Saving plots to file Box plots.

Exploratory Data Analysis: Introduction, Questions, Variation, Missing values, Covariations, Patterns and Models

UNIT IV

R PROGRAMMING

Functions: Introduction, Conditional Execution, Function Arguments, Return Values; Vectors: Introduction, vector basics, Important types of Atomic vector, Using Atomic Vectors, Recursive Vectors, Attributes, Argumented vectors.

UNIT V

MODELS

Model basics with modellr, Model building and Many Models with purrr and broom.

Text Book(s)

1) Norman Matloff, The Art of R Programming: A Tour of Statistical Software Design, No Starch Press Edition: 2011
2) Garrett Grolemund, Hadley Wickham, R for Data Science, O'Relly,2016

Reference Books

3) Beginning Data Science in R: Data Analysis, Visualization, and Modelling for the Data Scientist. by Thomas Mailund

List of Experiments

1. Experiments on various data structures available in R.

4) Write a R program to simulate functional programming of statistical parameter(mean, median and mode)
5) Simulate the concept of data cleaning using data set.
6) Simulate the concept of handling missing values with average.
7) Implement the various plotting scheme using R.
8) Bar chart (ii) Scatter plot (iii) Box plot
9) To understand and implement the concept of loop statement
10) To understand and implement the concept of vectors
11) To understand and implement the concept of various models in R
12) To understand and implement the concept of various data transformation techniques

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3										3	3
CO2	3	3	2	1	3								3	3
CO3	3	3	2	2									3	3
CO4	2	2	2										3	3

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B.Tech II Semester (Common to All Branhes)

20AHS15 Quantitative Aptitude and Reasoning-II

(Audit Course)

L	P	T	C
2	0	0	0

UNIT 1: QUANTITATIVE ABILITY III

Profit, Loss and Discount – Cost Price – Selling Price – Retail Price – Markup Price – Ratio and Proportion Antecedent – Consequent - Mean Proportion –Direct variation – Indirect Variation – Joint Variation Partnership – Mixture and Allegation – Problems on Ages – Surds and Indices

UNIT 2: QUANTITATIVE ABILITY IV

Time Speed and Distance – Uniform and Variable speed – Conversion - Average Speed - Relative speed – Effective speed - Problems on Trains – Stationary point and object – Moving Point and Object – Boats and Streams – Downstream and Upstream - Races and Games – Head start – Dead heat – Escalator – Number of steps

UNIT 3: REASONING ABILITY II

Syllogism – Statement and Conclusion - Data Sufficiency – Data Arrangement – Linear and Circular arrangement - Data Interpretation - Line Graph – Bar graph – Pie Chart -

UNIT 4: VERBAL II

Tense – Present Tense, Past Tense, Future Tense - Voice – Active voice, Passive voice and Active to Passive Voice Conversion Rules – Speech – Direct Speech, Indirect Speech and Direct to Indirect Speech Conversion Rules – Essay Writing – Types, Steps, Format.

UNIT 5: SOFT SKILL II

Time Management - Stress Management - Team Work - Accent and Voice Communication - Interview Skills

HONORS DEGREE: Students has to acquire 20 credits with minimum one subject from each pool @ 4 credits per subject.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

II B.Tech II Semester (Common to CSE (AI &ML))

L	T	P	C
4	-	-	4

20ACM42 EXPERT SYSTEMS

COURSE OUTCOMES:

Upon the completion of the course, the students will be able to:

1. Summarize the fundamentals of knowledge based system and representation.
2. Apply probabilistic reasoning to deal with inconsistencies and uncertainties.
3. Distinguish different knowledge structure and OOPs representation for Expert systems.
4. Analyze the architecture and knowledge system building tools for Expert systems.

UNIT I: 9 hrs.

Overview of Artificial Intelligence: Definition & Importance of AI. Knowledge: General Concepts: Introduction, Definition and Importance of Knowledge, Knowledge-Based Systems, And Representation of Knowledge, Knowledge Organization, Knowledge Manipulation, And Acquisition of Knowledge

UNIT II: 9 hrs.

Knowledge Representation: Introduction, Syntax and Semantics for Propositional logic, Syntax, and Semantics for FOPL, Properties of Wffs, Conversion to Clausal Form, Inference Rules, The Resolution Principle, No deductive Inference Methods, representation Using Rules.

UNIT III: 9 hrs.

Dealing with Inconsistencies and Uncertainties: Introduction, Truth Maintenance Systems, Default Reasoning and the Closed World Assumption, Predicate Completion and Circumscription, Modal and Temporal Logics.

Probabilistic Reasoning: Introduction, Bayesian Probabilistic Inference, Possible

World, Representations, Dumpster-Shafer Theory, Ad-Hoc Methods.

UNIT IV: 9 hrs.

Structured Knowledge: Graphs, Frames and Related Structures: Introduction, Associative Networks, Frame Structures, Conceptual Dependencies and Scripts.

Object-Oriented Representations: Introduction, Overview of Objects, Classes, Messages and Methods, Simulation Example using an OOS Program.

UNIT V: 9 hrs.

Knowledge Organization and Management: Introduction, Indexing and Retrieval Techniques, Integrating Knowledge in Memory, Memory Organization Systems.

Expert Systems Architectures: Introduction, Rule Base d System Architecture, Non - Production System Architecture, Dealing with uncertainty, Knowledge Acquisition and Validation, Knowledge System Building Tools.

TEXT BOOKS:

1. Dan W. Patterson - Introduction to Artificial Intelligence and Expert Systems, PHI,New Delhi, 2006.

REFERENCE BOOKS:

1. E.Rich & K. Knight - Artificial Intelligence, 2/e,TMH,NewDelhi
2. P.H. Winston - Artificial Intelligence, 3/e, Pearson Edition, New Delhi, 2006.
3. D.W. Rolston,- Principles of AI & Expert System Development, TMH, New Delhi.

MAPPING OF COS TO POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	1	-	-	-	-	-	-	3	3	1	-
CO2	-	3	-	2	-	-	-	-	-	-	-	-	3	1	-
CO3	-	3	2	1	-	-	-	-	-	-	-	-	2	-	-

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

II B.Tech II Semester (Common to CSE (AI &ML))

L	T	P	C
4	-	-	4

20ACM43 - ANALYTICAL BIOINFORMATICS

COURSE OUTCOMES:

Upon the completion of the course, the students will be able to:

1. Apply knowledge of bioinformatics in a practical project.
2. Connect critical thinking and research methods in Bioinformatics to understand computational and experimental data.
3. Evaluate sequence, structural, and functional analysis of biomolecules
4. Compare the databases, tools, repositories and be able to use each one to extract specific information
5. Test the selected tools at NCBI and EBI to run simple analyses on genomic sequences, Protein sequences & nucleotide.

UNIT I Introduction to bioinformatics 9 hrs.

Scope and applications of bioinformatics, Alignment of pairs of sequences; Introduction- Definition of sequence alignment, Methods - Dot matrix sequence comparison; **Pair wise sequence alignment** Dynamic programming algorithm for sequence alignment – Global Alignment: NeedlemanWunsch, Local Alignment: Smith-Waterman, Gap penalty, assessing the significance of an alignment

UNIT II Multiple sequence alignment 9 hrs.

Dynamic programming, progressive methods, Iterative methods, MSA using CLUSTAL W, PILEUP and CLUSTAL X, purpose and applications of multiple sequence alignment; **Scoring matrices**-Similarity searches-PAM and BlOSUM matrix, Dayhoff mutation matrix , construction of PAM and BLOSUM matrix. Differences between PAM & BLOSUM

UNIT III Database search methods 9 hrs.

Database searching for similar sequences. Sequence similarity search, FASTA sequence database similarity search, BLAST sequence database similarity search, other methods of comparing database of sequences and patterns. **Protein amino acid sequence databases–** UniProt Knowledgebase : SwissProt/TrEMBL - Protein Information Resource (PIR)

UNIT IV Protein structure databases 9 hrs.

History of structural biology - Protein Data Bank (PDB), contents of a PDB file- SCOP : SCOP: Structural Classification of Proteins - CATH : Protein Structure Classification database ;**Protein function and pathway database**:-Pfam-protein family database - GO-gene ontology, PROSITE-protein function pattern and profile, ENZYME-Enzyme commission, KEGG Pathway database; **Protein-protein interactions**:-BioGRID: Database of Protein, Chemical, and Genetic Interactions, STRING : functional protein association networks, DIP - Database of Interacting Proteins.

UNIT V Neural Networks & Hidden Markov Models 9 hrs.

The Theory -Introduction – Priors & likelihoods - Learning algorithms: back propagation - Neural Networks: Applications - Sequence encoding & output interpretation- Sequence correlations & neural networks **Hidden Markov Models_**:-The Theory - Introduction -Prior information & initialization -Likelihood & basic algorithms -Learning algorithms -Applications of HMMs: general aspects -Protein applications

TEXT BOOK(S)

1.Bioinformatics: Sequence and Genome Analysis David W. Mount, David Mount
2. Bioinformatics: the Machine Learning Approach – Pierre Baldi and Søren Brunak Publisher: MIT Press.

REFERENCE BOOKS

1.Hooman H Rashidi, Lukas K Buehler. Bioinformatics Basics. - 2000.
2. Per Jambeck, Cynthia Gibas. Developing Bioinformatics Computer Skills. Computers – 2001.
3. Bioinformatics Methods and Protocols: Methods and Protocols. edited by Stephen Misener, Stephen A Krawetz - Science – 1999.

MAPPING OF COS TO POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-		-	-	-	-	-	-		3	3	-
CO2	-	3	-	2	-	-	-	-	-	-	-	-	2	3	-
CO3	-			3	-	-	-	-	-	-	-	-	3	3	-
CO4				3									3	3	
CO5			3										3	3	

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

II B.Tech II Semester - CSE (AI &ML))

L	T	P	C
4	-	-	4

20ACM44 APPLIED CRYPTOGRAPHY

COURSE OUTCOMES

Upon the completion of the course, the students will be able to:

1. Understand the core functionalities of different cryptographic techniques.
2. Analyze the concepts of private and public key cryptography for secured data transfer
3. Analyze different types of attacks on var

Describe the various types of ciphers, attacks

UNIT I: 8 hrs.

Classical Encryption Techniques and their Cryptanalysis: Symmetric cipher model, Substitution techniques, Transposition techniques, Rotor machine, Steganography, One-Time Pad (Vernam's Cipher), Limitations of Perfect Secrecy, Shannon's Theorem

UNIT II: 9 hrs.

Private-Key Encryption Schemes and Block Ciphers: Pseudorandom Functions and permutations, Private-Key Encryption Schemes from Pseudorandom Functions, DES – The Data Encryption Standard, Attacks on DES, Single-Round DES, Two-Round DES, ThreeRound DES, Brute Force Search, Best Known Attacks on Full DES, Increasing the Key size for DES, Modes of Operation.

UNIT III: 9 hrs.

Public-Key (Asymmetric) Cryptography: Public-Key Problems and Mathematical Background, Diffie-Hellman Key Agreement, El-Gamal Encryption Scheme, RSA Encryption, Security of RSA, Hybrid Encryption , Attacks on RSA, Private and Public-Key Reversal, Common Modulus Attack, Simplified Broadcast Attack , Timing Attacks, Elliptic Curve Cryptography

UNIT IV: 9 hrs.

Hash Functions: Definition and Properties, Constructions of Collision-Resistant Hash Functions, Popular Uses of Collision-Resistant Hash Functions, Random Oracle Model. Hash algorithms: MD5, SHA-256.

UNIT V: 9 hrs.

Key Distribution using Symmetric and Asymmetric encryption, Distribution of Public Keys,

Remote User Authentication, Kerberos

TEXT BOOKS:

1. K. M. Martin, “Everyday Cryptography” , Oxford University Press (2012).
2. N. Ferguson, Bruce Schneier and T. Kohno, “Cryptography Engineering” Wiley (2010)

REFERENCE BOOKS:

1. William Stallings, “Cryptography & Network Security Principles and Practice”, Pearson Education.

	PO -1	PO -2	PO -3	PO -4	PO -5	PO -6	PO -7	PO -8	PO -9	PO -10	PO -11	PO -12	PSO -1	PSO -2	PSO -3
CO -1	3	3	2	2	3										
CO -2	3	2	2	2	2										
CO -3	3	1	2	1	2							1			

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

Sri Venkateswara College of Engineering and Technology
(Autonomous)

II B.Tech II Semester (Common to CSE (AI &ML))

L	T	P	C
4	-	-	4

20ACM45 Artificial Intelligence for Robotics

Course Outcomes:

Upon the completion of the course, the students will be able to:

1. Apply the basic principles behind Robotics intelligence.
2. Apply the algorithms required for task analysis
3. Design practical robots using appropriate measures
4. Design and simulation of neural network for image recognition.

UNIT –I 10 hrs.

Robotics Paradigm :- Machine intelligence, History of Robotics, Types of Robots, Setting up your Robot: Technical requirements, Robot anatomy, Subsumption architecture, Display devices, Software and Hardware setup.

Foundation for Advanced Robotics and AI:- The basic principle of robotics and AI, Sensing, Navigation, Planning, Uncertainty, Robot Control system and a decision making framework, Robot Kinematics and Path Planning, Artificial Personality: Emotion state machine, Creating a model of human behavior, Robot emotion engine, Human emotional model.

UNIT- II 9 hrs.

Concept for a Practical Robot Design Process :- A systems engineering based approach to robotics: Cleaning up the environment; Use cases: The problem Who, What, When and Where; Storyboards: Project goals, Decomposing hardware needs, breaking down software needs, writing a specification; Task Analysis.

UNIT- III 9 hrs.

Object Recognition Using Neural Networks and Supervised Learning :- Image recognition training and deployment process, Artificial neurons, convolution, convolutional neural network, Build the object detector

UNIT- IV 9 hrs.

Teaching the Robot arm: Adaptive learning rate, Q-learning implementation, indexed states and actions, Genetic algorithms

Speech Recognition :- Natural language processing - Reasoning from context - Understanding intent - Speech recognition - Text to speech

UNIT -V 9 hrs.

Task analysis in Robots : Decision trees for robot movements - Pruning - Entropy - One hot encoding - Random forests - Grid searching and A* (A-Star) - D* (Dynamic A*) Algorithm

Text Books:

1. Francis X. Govers, Artificial Intelligence for Robotics, Packt Publishing, O'Reilly, 2018

Reference Books:

1. Robin R Murphy, Introduction to AI Robotics, MIT Press, 2019
2. J. Craig, Introduction to Robotics Mechanics and Control, Pearson, 2018.
3. G. Long, Fundamentals of Robot Mechanics, Quintus-Hyperion, 2015

MAPPING OF COS TO POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3												
CO2	3	3	2	3	2										
CO3	3	3	1						1						
CO4	3	3	1						1						

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech II Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
3	-	2	4

20ACS12 DESIGN & ANALYSIS OF ALGORITHMS

Course Outcomes:

After Completion of the course the student will be able to

1. Describe computational solution to well-known problems like searching, sorting etc.
2. Estimate the computational complexity of different algorithms.
3. Devise an algorithm using appropriate design strategies for problem solving.
4. Understand memory hierarchy and its impact on computer cost/performance

UNIT-I 8hrs

Basics of Algorithms and Mathematics:

What is an algorithm? Algorithm Specification, Analysis Framework, Performance Analysis: Space complexity, Time complexity.

Analysis of Algorithm: Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω), Theta notation (θ), and Little-oh notation (o), Mathematical analysis of non-Recursive and recursive Algorithms with Examples. Important Problem Types: Sorting, Searching, String processing.

UNIT-II ` 9hrs

Divide and Conquer Algorithm:

Introduction, multiplying large Integers Problem, Binary Search, Sorting (Merge Sort, Quick Sort), Matrix Multiplication.

Greedy Algorithm

General Characteristics, Problem solving, Activity selection problem, Elements of Greedy Strategy, Minimum Cost Spanning trees, Prim's Algorithm, Kruskal's Algorithm. Single source shortest paths: Dijkstra's Algorithm, The Knapsack Problem, Job Scheduling Problem.

UNIT-III 8hrs

Dynamic Programming: Introduction, General method with Examples, Multistage Graphs Transitive Closure: Warshall‟s Algorithm All Pairs Shortest Paths: Floyd's Algorithm, Optimal Binary Search Trees, Knapsack problem, Bellman-Ford Algorithm, Travelling Sales Person problem.

UNIT-IV

7hrs

Exploring GraphIntroduction, Traversing Trees – Preconditioning, Undirected Graph, Directed Graph, Depth First Search ,Breath First Search, Sum of subsets problem, 0/1 The Knapsack Problem, Graph coloring, Hamiltonian cycles.

UNIT-V

Backtracking **8hrs**

Introduction, General Template The naive string-matching algorithm, The Rabin, Karp algorithm, String Matching with finite automata, The four queens' problem, The Eight queens' problem.

Introduction to NP, Completeness:

The class P and NP, Polynomial reduction, NP Completeness Problem, NP Hard Problems.

LIST OF EXPERIMENTS

1. Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versusn.The elements can be read from a file or can be generated using the random number generator.
2. Obtain the Topological ordering of vertices in a givendigraph
3. Implement 0/1 Knapsack problem using Dynamic Programming
4. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra'salgorithm
5. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal'salgorithm.
6. Check whether a given graph is connected or not using DFS method.
7. Find Minimum Cost Spanning Tree of a given undirected graph usingPrim‟salgorithm.
8. Implement N Queen's problem using BackTracking.
9. Implement All-Pairs Shortest Paths problem using **Floyd'salgorithm.**
10. Implement **Travelling Sales Person problem** using Dynamicprogramming

Text Books:

1. "Fundamentals of Computer Algorithms", E. Horowitz, S. Sahani andS.Rajasekran, Galgotia Publication,2008.
2. Introduction to Algorithms, Third Edition, Thomas H. Cormen, Charles E. Leiserson, RonaldL. Rivest and Clifford Stein, PHI,2009.
3. Introduction to the Design and Analysis of Algorithms, Anany Levitin:, 2rd Edition, 2009. Pearson.

Reference Books:

1. Design and Analysis of Algorithms, Parag Himanshu Dave and Himanshu Bhalachandra

Dave, Pearson,2009.
2. Fundamental of Algorithms by Gills Brassard, Paul Bratley, PHI,1996.
3. Introduction to Design and Analysis of Algorithms, Anany Levitin, Pearson,2011.
4. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition,PHI.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	1	-	-	-	-	-	-	-	-	3	-
CO2	3	1	1	2	-	-	-	-	-	-	-	-	3	1
CO3	2	2	2	2	-	-	-	-	-	-	-	-	2	2
CO4	3	2	2	-	-	-	-	-	-	-	-	-	3	2

3- High mapping **2-Medium Mapping** **1- Low Mapping**

B.Tech CSE (AI&ML) – Minors (Health Care)

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech II Semester (Common to CSE (AI &ML))

L	T	P	C
4	-	-	4

20ACM75 DEEP LEARNING FOR MEDICAL IMAGE ANALYSIS

Course Objectives:

The objective of this course are to:

1. *Explore the concepts of Neural Networks and Deep Learning*
2. *Describe Medical Image Detection and Recognition..*
3. *Introduce Deep Voting and Structured Regression using Convonutional Neural Network*
4. *Familiarize Medical Image Registration, Registration using Learned feature Representation.*
5. *Study Deep Networks and supervised Synthesis Using coupled sparse representation.*

UNIT –I 10 hrs.

An Introduction to Neural Networks and Deep Learning:

Feed-Forward Neural Networks, Convolutional Neural Networks, Deep Models, Vanishing Gradient Problem, Deep Neural Networks, Deep Generative Models

An Introduction to Deep Convolutional Neural Nets for Computer Vision:

Convolutional Neural Networks, Building blocks of CNNs, CNN flavours: Region based CNN,Fully Convolutional Networks, Multi model Networks, CNNs with RNNs, Hyvrid learning Methods.

UNIT- II 10 hrs.

Medical Image Detection and Recognition:

Efficient Medical Image Parsing: Background and motivation, Methodology: Problem formulation, Sparse adaptive Deep Neural Networks, Marginal Space Deep Learning, An artificial Agent for Image Parsing

Multi-Instance Multi-Stage Deep Learning for Medical Image Recognition: Introduction, Methodoogy: Problem statement and framework overview, Learning Stage-I, Leraning stage-II, Runtime classification, Image classification on synthetic data

UNIT- III 9 hrs.

Deep Voting and Structured Regression:

Deep Voting Introduction, Methodology, Learning the Deep Voting Model, Weighted Voting Density Estimation. Structured regression for robust cell detection using convolutional Neural

Network, CNN-Based Structured Regression, CNN Architecture, Data Set and Implementation Details, Model Evaluation

UNIT- IV 10 hrs.

Medical Image registration:

Challenges of developing the state-of-the-art image registration method, Related Research: Linear vs Nonlinear model, Shallow vs Deep Model.

Learn Intrinsic Feature Representations By Unsupervised Deep Learning: Experimental Result on ADNI Datase, Experimental Result on LONI Dataset, Experimental Result on 7.0-T MR Image Dataset.

Registration Using Learned Feature Representations: Advantages of Feature Representations Learned by Deep Learning Network , Learning-Based Image Registration Framework, Experimental Results

UNIT -V 9 hrs.

Deep Networks and Mutual Information Maximization for Cross-Modal Medical Image Synthesis : Supervised Synthesis Using Location-Sensitive Deep Network, Back propagation

Network Simplification, Unsupervised Synthesis Using Mutual Information Maximization,

Generating Multiple Target Modality Candidates, Full Image Synthesis Using Best Candidates, Refinement Using Coupled Sparse Representation, Extension To Supervised Setting

COURSE OUTCOMES:

After Completion of the course the student will be able to

1. Understand Deep learning and Neural Networks Models for Computer Vision
2. Explain Medical Image recognition and frame overview
3. Recognize human activity and familiarize the challenges of intelligent human activity recognition.
4. Understand the concepts of Medical Image registration and cross model medical image synthesis.

TEXT BOOKS:

1. S. Kevin Zhou, Hayit Greenspan, Dinggang Shen, Deep Learning for Medical Image Analysis, First Edition,Academic Press,2019

REFERENCE BOOKS:

1. Le Lu • Yefeng Zheng • Gustavo Carneiro, Deep Learning and Convolutional Neural Networks for Medical Image Computing, Springer International Publishing, 2017

2. João Manuel R.S. Tavares • Renato Natal Jorge,Developments in Medical Image Processing and Computational Vision, Springer International Publishing, 2017

MAPPING OF COS TO POS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**2**	**3**												
CO2	**3**	**3**	**2**	**3**	**2**										
CO3	**3**	**3**	**2**						**2**		**2**				
CO4	**3**	**3**	**2**						**2**		**2**				

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

B.Tech CSE (AI&ML) – Minors (Surveillance Systems)

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech II Semester (Common to CSE (AI &ML))

L	T	P	C
4	-	-	4

20ACM80 IMAGE & VIDEO ANALYTICS

Course Objectives:

The objective of this course are to:

1. *Explore the concepts of digital image and video processing*
2. *Introduce the background modelling and Object classification using Neural Networks..*
3. *Introduce the Hidden Markov Models, and challenges of Intelligent activity recognition.*
4. *Familiarize video object tracking system and tracking challenges.*
5. *Infer the Surveillance systems and its applications*.

UNIT –I 10 hrs.

Basics of Image and Video Processing:- Basics of Image Processing, Introduction to Digital Image Processing, Digital Image Processing System, Digital Image Processing Methods, Digital Image Segmentation, Applications of Digital image processing.

Basics of Video Compression and Motion Analysis: Video Compression, Motion Segmentation, Motion Segmentation Algorithms, Optical Flow Methods, Applications of Digital video processing.

UNIT- II 9 hrs.

Background Modeling : Background Modeling Techniques, Shadow Detection and Removal.

Object Tracking : Object Classification, Object Classification Using Convolutional Neural Networks, Object Classification Using Regional Convolutional Neural Networks

UNIT- III 9 hrs.

Human Activity Recognition: Motion History Image, Human Activity Recognition, Hidden Markov Models, HMM-Based Activity Recognition, Dynamic Time Warping-Based Activity Recognition, Abnormal Activity Recognition, Challenges of Intelligent Human Activity Recognition

UNIT- IV 9 hrs.

Video Object Tracking : Introduction, Tracking Challenges, Steps of Video Object Tracking System, Kalman Filter, Region-Based Tracking, Contour-Based Tracking, Feature-Based Tracking,

Model-Based Tracking, KLT Tracker, Mean-Shift-Based Tracking, Applications of Tracking Algorithms.

UNIT -V 10 hrs.

Surveillance Systems:

Camera Network for Surveillance: Types of CCTV Cameras, Smart Cameras, Smart Imagers, Multiple View Geometry, Camera Network, Camera Placement, Camera Communication, Multiple Camera Coordination and Cooperation.

Surveillance Systems and Applications: Components of Video Surveillance Systems, Video Content Analytics, Baggage Exchange Detection, Fence-Crossing Detection, Military Applications. Transportation.

COURSE OUTCOMES:

After Completion of the course the student will be able to

1. Understand Digital image processing systems and its applications.
2. Explain background modeling techniques and object classification
3. Recognize human activity and familiarize the challenges of intelligent human activity recognition.
4. Understand the video tracking systems and its challenges.

TEXT BOOKS:

1. Maheshkumar H. Kolekar, Intelligent video surveillance systems _ an algorithmic approach, CRC Press, 2018

REFERENCE BOOKS:

1. Anthony C. Caputo, Digital Video Surveillance and Security, Published by Elsevier Inc, 2019
2. Herman Kruegle , CCTV Surveillance: Analog and Digital Video Practices and Technology Published by Elsevier Inc, 2007.

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	**3**	**2**	**3**												
CO2	**3**	**3**	**2**	**3**	**2**										
CO3	**3**	**3**	**2**						**2**		**2**				
CO4	**3**	**3**	**2**						**2**		**2**				

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

B.Tech CSE (AI&ML) – Minors (IOT)

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech II Semester (Common to CSE (AI &ML))

L	T	P	C
4	-	-	4

20ACM85 IOT FOR SMART CITIES

Course Objectives:

The objective of this course are to:

1. *Understand Machine-To-Machine Communications To Internet Of Things*
2. *Learn Geo-Centric Communication Technologies In Opportunistic Networks*
3. *Study Routing Protocol For Low Power And Lossy Iot Networks*
4. *To learn Machine Learning In Big Data Era For Smart City*
5. *Describe Smart World from Interfaces to Homes to Cities*

UNIT I INTRODUCTION TO IOT AND SMART CITIES 10 hrs.

What is IoT- IoT challenges - IoT Network Architecture and Design - Comparing IoT Architectures - IoT Data Management and Compute Stack - Smart Objects - Connecting Smart Objects - Introduction to Smart Cities and a Vision of Cyber - Human Cities - Provisioning and Governing Smart City Systems, Machine - To-Machine Communications to Internet of Things.

UNIT II IP AS THE IOT NETWORK LAYER 10 hrs.

The Business Case for IP-The Need for Optimization-Optimizing IP for IoT-Application Protocols for IoT-Provisioning Smart City Infrastructure-Research Context-Main Building Blocks of Software-Defined IoT Systems-Main Techniques for Provisioning Software-Defined IoT Cloud Systems-Prototype Implementation & Evaluation-Middleware for Utility-based Provisioning of Smart City Infrastructure= Governing Smart City Systems.

UNIT III MIDDLEWARE FOR SMART CITY INFRASTRUCTURE 10 hrs.

IoT Cloud Provisioning Middleware-Runtime Mechanisms for Multi-level Provisioning in the IoT Cloud,Governing Smart City Systems -GovOps – A Novel Methodology for Governance and Operations in IoT Cloud Systems-A Reference Model for GovOps Methodology -rtGovOps – A Runtime Framework for GovOps in Large-Scale IoT Cloud Systems-Main Runtime Mechanism of the rtGovOps Framework.

UNIT IV DISTRIBUTED MACHINE LEARNING IN BIG DATA ERA FOR SMART CITY 10 hrs.

The Stochastic Gradient Descent (SGD) In Parallelization--Parallelized SGD Based On Map reduce -Online Sgd In Round-Robin -Hogwild! For "Lock-Free"- Asysvrg For Asynchronous SGD Variant-Asgd With Single-Sided Communication-The Newton Method In Parallelization-The Convex Optimization Decomposition Method-Security In Smart Grids-Security Concerns, Trends And Requirements In Smart Grids -Security In A Cloud Infrastructure And Services For Smart Grids-The Smart Grid As An IoT.

UNIT V SMART WORLD FROM INTERFACES TO HOMES TO CITIES 10 hrs.

Applying Human–Computer Interaction Practices to IOT Prototyping-HCI Methodology-A Data-Centered Fog Platform for Smart Living-Introduction-Ehopes Elements and Dataflow-Fog Platform for Ehopes-Case Study, Resources and Practical Factors in Smart Home and City-Novel Usage of Radio Resources-Video Resources-Practical Considerations.

COURSE OUTCOMES:

After Completion of the course the student will be able to

1. Understand Machine-To-Machine Communications to Internet of Things
2. Recognize Geo-Centric Communication Technologies in Opportunistic Networks
3. Analyze the various Routing Protocols For Low Power And Lossy Iot Networks
4. Apply Machine Learning In Big Data Era For Smart City

TEXT BOOKS:

1.Hongjian Sun, Chao Wang, Bashar I. Ahamad , "From Internet of Things to Smart Cities
2.Enabling Technologies", CRC Press Taylor & Francis Group., International Standard Book Number-13: 978-1-4987-7378-2 (Hardback)

REFERENCE BOOKS:

1.Schahram Dustdar · Stefan Nastić Ognjen Šćekić,"Smart Cities:The Internet of Things, People and Systems",Springer.
2.Raj Kamal,"Internet of Things :Architecture and Design Principles",McGraw Hill Education (India) Private Limited.
3.David Hanes,Gonzalo Salgueiro,Patrick Grossetete,Rob Barton,Jerome Henry,"IoT Fundamentals: Networking Technologies,Protocols,and Use Cases for the Internet of Things", Copyright© 2017 Cisco Systems.

Mapping of COs with POs & PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 1	PSO 2	PSO 3
CO1	3	-	-	3	3	-	-	-	-	-	-	-				
CO2	2	2	-	-	2	-	-	-	-	-	-	3				
CO3	2	-	-	3	-	-	-	-	-	-	-	-				
CO4	3	-	-	-	3	-	-	-	-	-	-	3				

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

B.Tech CSE (AI&ML) – Minors (Cyber Security)

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech II Semester (Common to CSE (AI &ML))

L	T	P	C
4	-	-	4

20ACM90 AI FOR CYBER SECURITY

Course Objectives:

The objective of this course are to:

1. *Understand different types of AI agents, various AI search algorithms, fundamentals of knowledge representation, building of simple knowledge-based systems.*
2. *Apply knowledge representation, reasoning. Study of Markov Models enable the student ready to step into applied AI.*

UNIT – I 9 hrs.

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search).

UNIT – II 9 hrs.

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem.

UNIT – III 9 hrs.

Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Nonmonotonic Reasoning, Other Knowledge Representation Schemes Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks.

UNIT – IV 10 hrs.

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics

Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT – V **10 hrs.**

Cybercrime, Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security. Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service. Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

TEXT BOOKS:

1.Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, PrenticeHall, 2010.
2.Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, ComputerForensics and Legal Perspectives, Wiley
3.B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles,Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCE BOOKS:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving,Pearson Education, 6th ed., 2009.
3. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
4. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

COURSE OUTCOMES:

After Completion of the course the student will be able to
1. To understand the fundamentals of knowledge representation schemes in AI.
2. To familiarize various types of cyber-attacks Using AI.
3. To study the overview of the cyber laws.
4. To learn about the defensive techniques against cyber-attacks.

Mapping of COs with POs & PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 1	PSO 2	PSO 3
CO1	3	-	-	3	3	-	-	-	-	-	-	3				
CO2	3	3	-	-	3	-	-	-	-	-	-	3				
CO3	3	-	-	-	-	3	-	-	-	-	-	3				
CO4	3	-	-	-	3	-	-	-	-	-	-	3				

3-High Mapping **2-Medium Mapping** **1-Low Mapping**