Department Of Computer Science And Engineering

2021-22 Admitted batch

III Semester B.E. (CSE)

Sl. No	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION MARKS		
					L	T	P	CIE	SEE	Total
1	BSC	21UMA301C	Numerical Techniques and Integral Transforms	3	3	0	0	50	50	100
2	PCC	21UCS307C	Digital Systems	3	3	0	0	50	50	100
3	PCC	21UCS302C	Computer Organization	3	3	0	0	50	50	100
4	PCC	21UCS303C	Data Structures	4	3	2	0	50	50	100
5	PCC	21UCS304L	Digital Systems Lab	1	0	0	2	50	50	100
6	PCC	21UCS305L	Data Structures Lab	1	0	0	2	50	50	100
7	AEC	21UCS306C	Professional Communication and Ethics	1	0	2	0	100	_	100
8	UHV	21UHS324C	Universal Human Values II	1	1	0	0	50	50	100
9	HSMC	21UHS321C	Constitution of India	1	1	0	0	50	50	100
		21UMA300M	Bridge Course Mathematics-I *	0	3	0	0	50	50	100
*Only for Lateral Entry students Total				18	14	4	4	500	400	900

2021-22 Admitted batch

IV Semester B.E. (CSE)

Sl. No	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION MARKS		
					L	T	P	CIE	SEE	total
1.	BSC	21UMA401C	Statistics and Probability Distribution	3	3	0	0	50	50	100
2.	PCC	21UCS409C	Database Management System	3	2	2	0	50	50	100
3.	PCC	21UCS402C	Operating Systems	3	2	2	0	50	50	100
4.	PCC	21UCS403C	Object Oriented Programming with Java	3	3	0	0	50	50	100
5.	PCC	21UCS404C	Finite Automata and Formal Languages	3	3	0	0	50	50	100
6.	PCC	21UCS405L	Database Management System Lab	1	0	0	2	50	50	100
7.	PCC	21UCS406L	Object Oriented Programming with Java Lab	1	0	0	2	50	50	100
8.	PCC	21UCS407L	Operating Systems Lab	1	0	0	2	50	50	100
9.	HSMC	21UHS422C 21UHS423C	Samskrutika Kannada Balake Kannada	1	1	0	0	50	50	100
10	INT	21UCS408I	Summer Internship – I	2	-	-	-	100	----	100
		21UMA400M	Bridge Course Mathematics-II *	00	3	0	0	50	50	100
* Only for Lateral Entry students			Total	21	14	4	6	550	450	1000

2021-22 Admitted batch

V Semester B.E. (CSE)

Sl. No.	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION MARKS		
					L	T	P	CIE	SEE	Total
1.	**PCC**	**21UCS501C**	**Analysis and Design of Algorithms**	**3**	**2**	**0**	**2**	**50**	**50**	**100**
2.	**PCC**	**21UCS502C**	**Computer Networks**	4	**4**	0	**0**	**50**	**50**	**100**
3.	**PCC**	**21UCS503C**	**Web Programming**	**3**	**2**	**0**	**2**	**50**	**50**	**100**
4.	**PEC**	**21UCSXXXE** 21UCS065E	**Professional Elective Course - I** Python Application Programming	**3**	**3**	**0**	**0**	**50**	**50**	**100**
5.	**OEC**	**21UCSXXXN**	**Open Elective-I**	**3**	**3**	**0**	**0**	**50**	**50**	**100**
		21UCS531N	**AI and Robotics**							
		21UCS533N	**IOT and Applications**							
6.	**PCC**	**21UCS504L**	**Computer Networks Lab**	**1**	**0**	**0**	**2**	**50**	**50**	**100**
7.	**AEC**	**21UHS521C**	**Quantitative Aptitude and Professional Skills**	**2**	2	**0**	**0**	**50**	**50**	**100**
8.	**INT**	**21UCS505I**	**Summer Internship - II**	3	0	-	-	100	--	**100**
9.	**HSMC**	**21UBT523C**	**Environmental Studies**	**1**	**1**	**0**	**0**	**50**	**50**	**100**
Total				**23**	**17**	0	6	**500**	**400**	**900**

2021-22 Admitted batch

VI Semester B.E. (CSE)

Sl. No	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION MARKS		
					L	T	P	CIE	SEE	Total
	HSMC	21UHS600M	Indian Knowledge System	1	1	0	0	50	50	100
1.	BSC	21UCS601C	Theory of Computation (DMS)	3	3	0	0	50	50	100
2.	PCC	21UCS602C	Compiler Design	4	4	0	0	50	50	100
3.	PCC	21UCS603C	Machine Learning	3	3	0	0	50	50	100
4.	PEC	21UCSXXXE 21UCS036E	Professional Elective Course - II Adhoc Wireless Networks	3	3	0	0	50	50	100
5.	OEC	21UCSXXXN	Open Elective – II	3	3	0	0	50	50	100
		21UCS631N	Machine learning Using Python							
		21UCS634N	Software Engineering							
6.	OEC	21UCSXXXN	Open Elective – III	3	3	0	0	50	50	100
		21UCS633N	Human Computer Interface							
7.	PCC	21UCS604L	Machine Learning Lab	1	0	0	2	50	50	100
8.	MP	21UCS605P	Mini Project	2	0	0	4	50	50	100
Total				23	20	0	6	400	400	800

2021-22 Admitted batch

VII Semester B.E. (CSE)

Sl. No	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION MARKS		
					L	T	P	Cie	See	total
1.	HSMC	21UCS701C	Management and Entrepreneurship	3	3	0	0	50	50	100
2.	PCC	21UCS702C	Software Engineering	3	3	0	0	50	50	100
3.	PEC	21UCSXXXE 21UCS081E	Professional Elective Course-III Prompt Engineering	3	3	0	0	50	50	100
4.	PEC	21UCSXXXE	Professional Elective Course –IV	3	3	0	0	50	50	100
		21UCS003E	Cryptography and Network Security							
		21UCS070E	Block chain Technology							
5	Project	21UCS703P	Project Work	7	0	0	14	50	50	100
Total				19	12	0	14	250	250	500

2021-22 Admitted batch

VIII Semester B.E. (CSE)

Sl. No	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION MARKS		
					L	T	P	CIE	SEE	Total
1.	AEC	21UCS800O	MOOCs	3	-	-	-	25	75	100
2.	Seminar	21UCS801S	Technical Seminar	1	-	-	-	100	0	100
3.	INT	21UCS802I	Research/Industrial Internship	10	0	0	20	100	0	100
4.	AEC	21UCS803C	Research Methodology & Intellectual Property Rights	2	0	2	2	50	50	100
Total				16	0	2	22	275	125	400

*** 7th and 8th semesters are swapped between group 1 and group 2 students**

21UMA301C	Numerical Techniques and Integral Transforms	Credits: 03
L:T:P – 3:0:0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Numerical Analysis-I

Introduction to root finding problems, Bisection Method, Newton-Raphson method. Finite differences, forward and backward difference operators (no derivations on relations between operators) Newton-Gregory forward and backward interpolation formulae. (Without proof), Lagrange's and Newton's divided difference interpolation formulae (without proof).

UNIT–II	10 Hrs.

Numerical Analysis-II

Numerical differentiation using Newton's forward and backward formulae-problems. Trapezoidal rule, Simpson's one third rule, Simpson's three eighth rule and Weddle's rule (no derivation of any formulae)-problems. Euler's and Modified Euler's method, Runge-Kutta 4^{th} order method.

UNIT–III	10 Hrs.

Fourier series

Periodic functions, Conditions for Fourier series expansions, Fourier series expansion of continuous and functions having finite number of discontinuities, even and odd functions. Half-range series, practical harmonic analysis.

UNIT–IV	10 Hrs.

Fourier transforms and z-transforms

Infinite Fourier transforms and inverse Fourier transforms- simple properties, Fourier sine and Fourier cosine transforms, Inverse Fourier sine and cosine transforms. Z-transforms-definition, standard forms, linearity property, damping rule, shifting rule-problems. Inverse Z-transforms.

Reference Books *

1. Steven C Chapra&Raymond P Canale, Numerical Methods for Engineers
2. Dr. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi
3. H. K. Das, Advanced Engineering Mathematics, Chand & company Ltd, Ram Nagar, New Delhi
4. E Kreyszig, Advanced Engineering Mathematics,John Wiley & Sons

Course Outcomes**

After completion of the course student will be able to

1. Solve engineering problems using non-linear equations and interpolation techniques.
2. Solve problems using numerical differentiation and numerical integration.
3. Solve ordinary differential equations using numerical methods.
4. Solve Problems using the Fourier series.
5. Solve problems using the basic concepts of Fourier transforms and z –transforms

*** Books to be listed as per the format with decreasing level of coverage of syllabus**

**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	1		-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-

21UCS307C	Digital Systems	Credits: 03
L:T:P – 3:0:0		CIE Marks: 50
Total Hours/Week: 3		SEE Marks: 50

UNIT-I	10 Hrs.

Boolean algebra and Combinational Circuits: Boolean algebra definition, Principle of Duality, Boolean algebra theorems, Boolean formulas and functions, Normal forms. Minterm canonical form, m-notation, Maxterm Canonical form, M-notation.

Manipulation of Boolean expressions. Gates and combinational circuits. Incomplete Boolean functions and don't care conditions, Additional Boolean operations and Gates..

UNIT–II	10 Hrs.

Simplification of Boolean expressions: Karnaugh-maps, Use of Karnaugh-maps to minimize Boolean Expressions. Minimal Expressions of Incomplete Boolean Functions.

The Quine-McCluskey and Decimal methods for generating prime implicants and prime implicates. Map Entered Variables(MEV)

UNIT–III	10 Hrs.

Logic Design using MSI Components: Binary Adders and Substractor, Comparators, Decoders, Encoders, Multiplexers.

Flip Flops and its Applications: Basic bistable element, Latches: SR Latch, S'R' Latch, Gated SR Latch, Gated D Latch, Master Slave SR and JK flip-flops, Master Slave D and T FlipFlops, Edge Triggered flip-flops, Characteristic Equations

UNIT–IV	10 Hrs.

Registers: Serial In Serial Out, Circular, Parallel in Parallel Out, Parallel In Serial Out, Universal Shift Registers. **Counters:** Binary Ripple Counter, Synchronous Binary Counters, Mod and Ring counters. Design of Synchronous Counters.

HDL implementations of combinational and sequential circuits.

Reference Books

1. D.D. Givone, Digital Principles and Design, 2002, McGraw Hill.
2. Malvino, Leach and Saha, Digital Principles and applications,6th Edition,2007, McGrawHill.
3. R.D.Sudhakar ,Samuel, Applications Logic Design-A simplified approach, Revised Edition,2005, Sanguine Technical Publications.
4. Stephen Brown & Zvonko Vranesi cFundamental of digital Logic with Verilog Design, Tata McGraw Hill

Course Outcomes

After completion of the course student will be able to

1. Demonstrate the understanding of Boolean algebra.
2. Describe the working of Combinational circuits.
3. Apply the Boolean theorems, K-Map, Q-M and VEM methods to simplify Boolean expressions
4. Describe the working of Sequential circuits and its applications.
5. Simulate combinational circuits using HDL programming

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1										1	1		1
CO2	2	1										1	1		1
CO3	2											1	1		1
CO4	1	1	2									1	1		2
CO5	1	1	2									1	1		2

21UCS302C	Computer Organization	Credits: 03
03		CIE Marks: 50
Total Hours/Week: xx		SEE Marks: 50

UNIT-I	10 Hrs.

Basic structure of Computers: Computer types, Functional Units, Basic operational concepts, Bus structures

Machine instructions and programs: Numbers, Arithmetic operations and characters, Memory locations and addresses, Memory operations, Instructions and instruction sequencing, Addressing modes, Assembly language, assembler directives, number notation, , Stacks and Queues, Subroutines, Encoding of machine instructions

UNIT–II	10 Hrs.

Input/output organization: Accessing I/O devices, Interrupts-Interrupt hardware , Enabling and Disabling Interrupts, Handling Multiple devices, controlling device requests, Exceptions, Direct memory access – Bus Arbitrations, Buses- Asynchronous Bus and Synchronous bus

The memory system: Some Basic concepts, Semiconductor RAM memories, Read only memories, speed, size, and cost, cache memories

UNIT–III	10 Hrs.

Arithmetic Unit: Addition and subtraction of signed numbers, Design of fast adders, Multiplication of positive numbers, Signed operand multiplication, Fast multiplication. Integer Division, Floating point numbers and operations – IEEE standard for Floating point numbers, Arithmetic operations on Floating point numbers. Implementing Floating point operations.

UNIT–IV	10 Hrs.

Basic Processing Unit: Some fundamental concepts, Execution of complete instruction, Hardwired Control, Micro programmed control, Microinstructions,

Pipelining: basic concepts, role of cache memory, pipeline performance

Large computer systems: forms of parallel processing, array processor, the structure of general purpose and multiprocessors

Performance:

Processor Clock, Basic performance equation, pipelining and superscalar operations, Clock rate, Instruction set, compiler, performance measurement

Reference Books *

1. Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, Fifth Edition,.2017, Tata McGraw Hill
2. William Stallings, Computer Organization and Architecture', 7th Edition, 2007, PHI

Course Outcomes**

After completion of the course student will be able to

1. Explain the design and function of different units of computer
2. Perform the various operations on given data
3. Analyze the execution of the program and different organizations of functional units
4. Develop an assembly programs and micro programs for simple machine instructions
5. Design the basic functional units of computer

*** Books to be listed as per the format with decreasing level of coverage of syllabus**

**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	1	-	-	-	-	-	-	-	-	-	-	**1**	-	-	**1**
CO2	1	-	2	-	-	-	-	-	-	-	-	-	**1**	-	**1**
CO3	-	-	2	-	-	-	-	-	-	-	-	**1**	**1**	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	**1**	**1**	-	**1**
CO5	-	-		-	-	-	-	-	-	-	-	**1**	-	-	**3**

21UCS303C	Data Structures	Credits: 04
L:T:P – 3:2:0		CIE Marks: 50
Total Hours/Week: 05		SEE Marks: 50

UNIT-I	13 Hrs.
Pointer applications: Arrays and pointers, pointer arithmetic and arrays, passing an array to a function, Using pointers to functions. **Memory allocation functions, Array of pointers, pointers to void and pointers to functions.** **Recursion:** iterative and recursive definition iterative and recursive solution, designing recursive functions, limitations of recursion. **Stacks**: Basic stack operations: Push, Pop, Stack top, **Stack linked list:** Implementation, Data structure, Stack head, Stack data node, Stack algorithms, Create Stack, Push Stack, Stack top, Empty Stack, Full Stack, Stack count, Destroy Stack **C language implementations:** Insert data, Push Stack , Print Stack, Pop character **Stack ADT:** Data structure, ADT Implementations, Stack structure, Create stack, Push stack, Pop stack, Stack top, Empty stack, Stack count, Destroy stack **Stack Implementation using array**	
UNIT–II	**13 Hrs.**
Stack applications: **Reversing data:** Reverse a list, Convert decimal to binary, Infix to postfix transformation, Evaluating postfix expressions **Queues**: **Queue Operations**: Enqueue, Dequeue, Queue front, Queue rear, Queue example, **Queue Linked list design**: Data structure, Queue head, Queue data node, Queue algorithms, Create queue, Enqueue, Dequeue, Retrieving queue data, Empty queue, Full queue, Queue count, Destroy queue	
UNIT–III	**13 Hrs.**
General Linear lists: **Basic operations**, Insertion, Deletion, Retrieval, Traversal, **Implementation:** Data structure, Head node, Data node, Algorithms, Create list, Insert node, Delete node, List search, Retrieve node, Empty list, Full list, List count, Traverse list, Destroy list, **List ADT**: ADT functions, Create list, Add node, Internal insertion function, Remove node, Internal delete function, Search list, Internal search function, Retrieve node, Empty list Full list, List count, Traverse, Destroy list,	

Circular linked lists and Doubly linked lists: Create list, add node, delete node, retrieve node, search list.

UNIT–IV	13 Hrs.

Non-Linear lists: Trees: Basic tree concepts: Terminology, User representation

Binary trees: Properties, Height of binary trees, Balance, Complete and Nearly complete binary trees

Binary tree traversals: Depth-first traversals, Breadth-first traversals, **Expression Trees**: Infix traversal, Postfix traversal, Prefix traversal **Huffman code, General trees,**

Binary search trees: Basic concepts,

BST operations: Traversals, Searches, Insertion Find the smallest and largest node, BST search, Insertion, Deletion

Binary search tree ADT, Data structure, Head and node structure, Algorithms, Create a BST, Insert a BST, Internal insert function, Delete a BST, Internal delete function, Retrieve a BST, Internal retrieve function, Traverse a BST, Internal traverse function, Empty a BST, Full BST, BST count, Destroy a BST, Internal destroy function.

Graphs: Basic concepts, **Operations**: Insert vertex, Delete vertex, Add edge, Delete edge, Find vertex,

Graph storage structures: Adjacency matrix, Adjacency list.

Reference Books *

1. Behrouz A,Forouzan& Richard F Gilberg,,Computer Science A Structured Programming Approach Using C, (Chapter 6:6.9 Chapter 7,Chapter 9,10, Chapter 11:11.3,11.4,11.5, Chapter 12,Chapter 13, Chapter 14,Appendix G:G.1,G.2,G.3, Appendix H,I,Appendix J), Third Edition, Cengage Learning India Private Limited
2. Behrouz A. Forouzan and Richard F. Gilberg,,**Data Structure A Pseudocode Approach with C**, (Chapter 1(1.2,1.3,1.5), 2,3,4 (4.1-4.4), 5, 6(6.1-6.3)7(7.1-7.3), 11(11.1-11.3),12(12.2-12.4)13(13.1-13.3)Appendix F., 2nd Edition, 2005. Cengage Learning Publisher,
3. Aaron M. Tenanbaum ,YedidyahLangsam,Data Structures Using C, Pearson
4. YeshwantKanetkar,Data Structures Through C, BPB

Course Outcomes**

After completion of the course student will be able to

1. Demonstrate the understanding of pointers, dynamic memory allocation, recursion and data structures.
2. Explain implementation of data structures with and without ADT
3. Identify the data structures needed to solve given problem.
4. Design and develop solutions for simple problems using the data structures
5. Compare and contrast different data structures

* **Books to be listed as per the format with decreasing level of coverage of syllabus**

** **Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1		2	2	2	2								**3**		**2**
CO2		2	2	2	2								**2**		**2**
CO3		3	3	3	3								**3**		**3**
CO4		3	3	3	3								**3**		**3**
CO5		3	3	3	3								**3**		**3**

21UCS304L	Digital System Laboratory	Credits: 01
L:T:P -0:0:2		CIE Marks: 50
Total Hours/Week: 2		SEE Marks: 50

PART A((Hardware Implementation).

1. Design a Binary to Gray Code converter with K map simplification and ExOR Gate.
2. Given any 4-variable logic expression, simplify using K-MAP/Quine McCliskey and realize the simplified logic expression using 8:1 multiplexer IC.
3. Realize a full adder using 3-to-8 decoder IC and 4 input NAND gates.
4. Realize a full substractor circuit using 3 to 8 line decoder IC and 4 input NAND gate.
5. Realize a J-K Master/Slave Flip-Flop using NAND gates and verify its truth table.
6. Design and implement a mod-n (n<8) synchronous Up Counter using J-K Flip-Flop and basic gate ICs.
7. Design and implement a mod-n (n<8) synchronous Down Counter using J-K Flip-Flop and basic gate ICs.
8. Design and implement an asynchronous counter using decade counter IC to count up from (to n (n<=9) & display the numbers using 7-segment display.
9. Design a Ring and Johnson Counter using a 4-bit Shift Register IC.

Practice Assignments using Simulation package:

- Implementation of Boolean Expressions of basic logic gates such as 2-input/3-input AND,OR,NAND,NOR, EX-OR gates
- Simplification of simple Boolean Expressions in SOP/POS forms

PART- B (Software Implementation)

1. Write the Verilog/VHDL code for Binary to Gray Code converter and verify its working.
2. Write the Verilog/VHDL code for an 8:1 multiplexer. Simulate and verify its working.
3. Write the verilog/VHDL code for a full adder .Simulate and verify its working.
4. Write the Verilog/VHDL code for D Flip-Flop with positive-edge triggering. Simulate and verify its working.
5. Write a verilog/VHDL code for mod-8 up counter. Simulate and verify its working.
6. Write the verilog/VHDL code for switched tail counter. Simulate and verify its working

Course Outcomes

After completion of the course student will be able to

1. Design and implement combinational circuits.
2. Design and Implement sequential Circuits
3. Simulate sequential and combinational circuits using VHDL /Verilog Programming

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1										1	1		1
CO2	2	1										1	1		1
CO3	2	1	2									1	1		1

21UCS305L	Data Structures Lab	Credits:-1
L:T:P- 0:0:2		CIE Marks: 50
Total Hours/Week: 02		SEE Marks: 50

Assignment List

1. Write C program to perform the following using function pointer concept.
   i. **complex_sum( )** takes addresses of the two complex numbers as parameters as void* and returns the result as void *
   ii. **int_sum( )** takes two integer operand as void* as parameters and returns the result as void*.
   iii. **float_sum( )** takes two integer operand as void* as parameters and returns the result as void*.
   iv. **sum_two_nos( )** that takes addresses of two operands and address of the function that is to be invoked on these two operands
   v. **getfun( )** that accepts from the user appropriate function based on users choice.
   vi. **main( )** method that invokes these function based on users choice.
2. Write Recursive function for the followings:
   a. To find sum of first N natural numbers.
   b. To print first N Fibonacci series.
   c. To convert given decimal number to binary.
   d. Write main ( ) to call above functions.
3. Develop linked stack ADT and create stack of integer using the ADT's defined.
4. Develop array stack ADT and create stack of students using the ADT's defined.
5. Develop linked Queue ADT and create Queue of floats using the ADT's defined.
6. Develop array Queue ADT and create Queue of strings using the ADT's defined.
7. Create Linked list ADT and use the same to create list of student's information.
8. Create binary tree and allow following operations on tree

i. Search an element ii. Insert an element iii. Tree is balanced or not iv. No of occurrences of key element v. No of nodes, no of leaf nodes, no of intermediate node vi. Find parent of key node vii. Traverse in preorder, postorder, inorder, breadth first order viii. To copy tree

9. Create binary search tree of integers and allow following operations on tree:

i. Insert an element ii. Delete an element iii. Search an element iv. Tree is balanced or not v. No of occurrences of key element vi. No of nodes, no of leaf nodes, no of intermediate node vii. Find parent of key node viii. Traverse in preorder, postorder, inorder, breadth first order ix. To copy tree x. To print elements in descending order

Course Outcomes**

After completion of the course student will be able to

1. Write C programs to use data structures to represent, organize and manipulate data for given problem.
2. Design and implement solutions for organization of data using different data structures.
3. Choose appropriate data structures for representing, organizing and manipulating data for different kinds of problems

*** Books to be listed as per the format with decreasing level of coverage of syllabus**

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Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		3	3	3	3								3		3
CO2		3	3	3	3							3	3		3
CO3		3	3	3	3							2	3		3

21UCS306C	Professional Communication and Ethics	Credits:-1
L:T:P – 0:2:0		CIE Marks: 100
Total Hours/Week: 02		SEE Marks: -

Tutorials	10 Hrs.

1. **Communication skills (Verbal and Non Verbal):** Self-Introduction organizing the material - Introducing the topic – answering questions.
2. **Listening skills:** Exercises based on Listening (audio, speech, lectures, songs, listen and draw/speak etc)
3. **Conversations and Dialogues-** Exercises based onsituations, scenarios, skits, telephonic.
4. **Public Speaking-** Exercises based on different topics.
5. **Presentation skills-** individual presentation practice— presenting the visuals effectively, qualities of a good presentation with emphasis on body language and use of visual aids.
6. **Group Discussions-** Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills, instruction activities.
7. **Interview skills-**Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews.
8. **Writing skills(resume,letter)-** Letter writing, CV writing, Attending a meeting and Minute Preparation, Vocabulary Building.
9. **Reading Skills:** Speed Reading, Reading with the help of Audio Visual Aids, Reading Comprehension Skills.

Activities	10 Hrs.

1. **Communication skills (Verbal and Non Verbal)**
   a) Speaking on the topic given.
2. **Listening skills:**
   a) Given a topic, a student should speak about it and the others should summarize the information using proper listening skills.
   b) Given instructions from the teacher, students should apply it and exhibit it.
3. **Conversations and Dialogues**
   a) Given a situation the students should carry out proper conversation.

b) Carrying out telephonic conversations with different categories of persons.

4. **Public Speaking**
   a) Topics to be given to the student for giving awareness to the public.
5. **Presentation skills-**
   a) Presentation on technical topic using proper visual aids.
6. **Group Discussions**
   a) Participating in group discussions to solve any given situation.
   b) Carrying out debate.
7. **Interview skills.**
   a) Carrying out mock face-to-face interview.
8. **Writing skills(resume,letter)**
   a) Resume writing.
   b) Formal letter writing (leave application, job application etc).
9. **Reading Skills:**

i)Reading Comprehension and answering the questions.-problems

Reference Books *

1. Meenakshi Raman and Sangeeta Sharma,, Technical Communication Principles and practices, 2004,Oxford University Press
2. Meenakshi Raman and Prakash Singh, Business Communication,2006, Oxford University Press, ISBN13: 9780195676952
3. Urmila Rainad S,M Rai, Business Communication,2011, Himalaya Publishing House
4. M. Ashraf Rizivi, Effective Technical Communication, 2nd Edition, 2017,McGraw Hill
5. Aruna Koneru, Professional Communication, , 2008,Tata McGraw-Hill Education

Course Outcomes**

After completion of the course student will be able to

1. Analyze the variety of communication and listening skills.
2. Discuss a given technical/non-technical topic effectively in groups.
3. Create effective technical presentations.
4. Write an impressive resume, technical letters and face the interview confidently.
5. Reading clearly and precisely presenting the document.

* **Books to be listed as per the format with decreasing level of coverage of syllabus**

** **Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1		3		**2**			**2**	**1**	**2**	**3**		**3**			
CO2		3		**2**				**1**	**3**			**3**	**3**		
CO3	3							**1**	2	**3**		**3**	**3**		
CO4	3						**2**	**1**	2	**3**		**3**	**3**		
CO5								**1**	2	**3**		**3**			

21UHS324C	Universal Human Values-II	Credits:-01
L:T:P – 1:0:0		CIE Marks: 50
Total Hours/Week: 01		SEE Marks: 50

UNIT-I	04 Hrs.

Introduction to Value Education: Right Understanding; Relationship and Physical Facility; Understanding Value Education; Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity -the Basic Human Aspiration-Current Scenario and Method to Fulfill the Basic Human Aspirations.

UNIT–II	04 Hrs.

Harmony in the Human Being: Understanding Human being as the Co-existence of the Self and the Body, distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body,Programme to ensure self-regulation and Health

UNIT–III	04 Hrs.

Harmony in the Family and Society and Nature: Harmony in the Family – the Basic Unit of Human Interaction; 'Trust' – the Foundational Value in Relationship; 'Respect' **–** as the RightEvaluation: Other Feelings, Justice in Human-to-Human Relationship; Understanding Harmony in the Society;Vision for the Universal Human Order; Understanding Harmony in the Nature; Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature.

UNIT–IV	03 Hrs.

Implications of the Holistic Understanding – a Look at Professional Ethics Definitiveness of (Ethical) Human Conduct; A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order; Competence in Professional Ethics; Holistic Technologies, Production Systems and Management Models; Strategies for Transition towards Value-based Life and Profession

Reference Books *

1. R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics,, 2nd Revised Edition, 2019, Excel Books, New Delhi, ISBN 978-93-87034-47-1
2. RRGaur, R Asthana,G P Bagaria, Teachers'ManualforAFoundationCourseinHumanValuesandProfessionalEthics, 2nd Revised Edition, 2019,Excel Books, New Delhi, ISBN 978-93- 87034- 53-2
3. A Nagaraj, JeevanVidya :EkParichaya, 1999. JeevanVidyaPrakashan, Amarkantak
4. A.N. Tripathi, Human Values, 1999.,New Age Intl. Publishers, New Delhi
5. The Story of Stuff(book)
6. Mohandas KaramchandGandhi, The Story of My Experiments with Truth
7. E. F Schumacher, Small is Beautiful
8. CecileAndrews,Slow is Beautiful
9. J CKumarappa, Economy of Permanence
10. PanditSunderlal, Bharat Mein Angreji Raj
11. Dharampal, Rediscovering India
12. Mohandas KaramchandGandhi, Hind Swaraj or Indian Home Rule
13. Maulana Abdul KalamAzad, India Wins Freedom
14. Romain Rolland, Vivekananda
15. Gandhi, Romain Rolland

Course Outcomes**
After completion of the course student will be able to 1. Explore holistic vision oflife - themselves and their surroundings. 2. Develop competence and capabilities for maintaining Health andHygiene. 3. Analyse various problems in life, family,Societyand in handling problems with Sustainable Solutions. 4. Apply values to their own self in different day-to-day settings in real life and in handling problems with sustainable solutions. **5.** Adopt the value of appreciation and aspiration for excellence and gratitude for all

*** Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	**Programme Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1							**3**	**2**	**3**			**1**			
CO2						3	**3**	**1**	**1**			**1**			
CO3						3	**3**	**2**	1			**1**			
CO4						2	**2**	**3**	2			**1**			
CO5								**3**				**1**			

21UHS321C/21UHS421C	Constitution Of India	Credits:-01
L:T:P – 1:0:0		CIE Marks: 50
Total Hours/Week: 01		SEE Marks: 50

UNIT-I	04 Hrs.

Introduction Indian constitution: The Salient Features of the Indian Constitution. Preamble to the Constitution of India.Fundamental Rights, Directive Principles of State policy and Fundamental Duties.

UNIT–II	04 Hrs.

The Union and State Governments: The Union Executive, The Union Legislature and The Union Judiciary - The Supreme Court of India.

UNIT–III	04 Hrs.

The Indian State Government: The State Executive, The State legislature and The State Judiciary **The Local Government:** Local Government-Panchayat raj system with special reference to 73rd and Urban Local Self Govt. with special reference to74th Amendment

UNIT–IV	03 Hrs.

Electionprovisions,Emergencyprovisions,Amendmentoftheconstitution:

Reference Books *

1. Venkatesh B. R. and Merunandan K. B, An introduction to the constitution of India and Profession Ethics, Idea International Publication, Bangalore
2. M. V. Pylee, Introduction to the Constitution of India,Vikaspublication, 4th Edition, 2005
3. K. R. Phaneesh, The Constitution of India and Profession of Ethics, Sudha Publication, Bangalore
4. Durga Das Basu, Introduction to the constitution of India, (Student Edition),19thedition,2008. Prentice-Hall EEE
5. Charles Harries J. R. and Michard and Michael J. Rabins,Engineering Ethics

Course Outcomes**

After completion of the course student will be able to

1. UnderstandandexplainthesignificanceofIndianConstitutionasthefundamentallawof the land.
2. Exercisehisfundamentalrightsinpropersenseatthesametimeidentifieshis responsibilities in nationalbuilding.
3. AnalyzetheIndianpolitical system,thepowersandfunctionsoftheUnion, State and Local Governments indetail.
4. Elaborate Electoral Process, Emergency provisions and Amendment procedure.
5. UnderstandandexplainthesignificanceofIndianConstitutionasthefundamentallawof theland.

*** Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1						1	1					1			
CO2						3	1					2			
CO3						1	1					1			
CO4												1			
CO5						1	1					1			

21UM300M	Bridge Course Mathematics-I (Mandatory)	Credits:0
L:T:P – 3:0:0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Differential Calculus:
Review of elementary calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Taylor's and Maclaurin's series expansions for one variable (without proof) problems

UNIT–II	10 Hrs.

Partial differentiation: Introduction to function of several variables, Partial derivatives; Euler's theorem - problems. Total derivatives-differentiation of composite functions. Jacobians-problems

UNIT–III	10 Hrs.

Integral Calculus:
Multiple integrals: Evaluation of double and triple integrals. Area bounded by the curve.
Beta and Gamma functions: Definitions, Relation between beta and gamma functions-problems.

UNIT–IV	10 Hrs.

Vector Differentiation: Scalar and vector fields**.** Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- problems

Reference Books *

6. Dr. B.S. Grewal,Higher Engineering Mathematics, 2017, Khanna Publishers, New Delh
7. E Kreyszig,,Advanced Engineering Mathematics, 2014,John Wiley & Sons , Pvt.Ltd
8. Earl D. Rainville and Phillip E, Bedient, Elementary Differential Equations,Sixth Edition
9. Erwin Kreyszig, Advanced Engineering Mathematics,2014,John Wiley & Sons

Course Outcomes**

After completion of the course student will be able to

4. Apply the concepts of polar curves to solve Engineering problems
5. Apply the knowledge of partial differentiation to solve Engineering problems.
6. Apply the concepts of multiple integrals and their usage in computing the area and volumes.
7. Evaluate improper integrals using beta and gamma functions.
8. Apply the knowledge of differentiation of vectors to solve the engineering problems.

*** Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2													
CO2	1	2													
CO3	1	2													
CO4	1	2													
CO5	1	2													

IV Semester B.E. (CSE)

Sl. No	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION MARKS		
					L	T	P	CIE	SEE	total
1.	BSC	21UMA401C	Statistics and Probability Distribution	3	3	0	0	50	50	100
2.	PCC	21UCS409C	Database Management System	3	2	2	0	50	50	100
3.	PCC	21UCS402C	Operating Systems	3	2	2	0	50	50	100
4.	PCC	21UCS403C	Object Oriented Programming with Java	3	3	0	0	50	50	100
5.	PCC	21UCS404C	Finite Automata and Formal Languages	3	3	0	0	50	50	100
6.	PCC	21UCS405L	Database Management System Lab	1	0	0	2	50	50	100
7.	PCC	21UCS406L	Object Oriented Programming with Java Lab	1	0	0	2	50	50	100
8.	PCC	21UCS407L	Operating Systems Lab	1	0	0	2	50	50	100
9.	HSMC	21UHS422C 21UHS423C	Samskrutika Kannada Balake Kannada	1	1	0	0	50	50	100
10	INT	21UCS408I	Summer Internship – I	2	-	-	-	100	----	100
		21UMA400M	Bridge Course Mathematics-II *	00	3	0	0	50	50	100
* Only for Lateral Entry students			Total	21	14	4	6	550	450	1000

BSC	ESC	HSMC	AEC	PCC	PEC	OEC	PROJ	INT	SEMI	MAN(UHV)
03	--	01	--	15	--	--	--	--	--	--

21UMA401C	Statistics and Probability Distribution	Credits:-03
L:T:P – 3:0:0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Statistics:
Curve fitting by the method of least squares: $y = a + bx$, $y = ab^x$, $y = a + bx + cx^2$. Correlation, expression for the rank correlation coefficient and regression.

UNIT–II	10 Hrs.

Probability: addition rule, conditional probability, multiplication rule, Baye's rule. Discrete and continuous random variables-Probability density function, Cumulative distribution function, Problems on expectation and variance.

UNIT–III	10 Hrs.

Probability distributions:

Binomial distributions, Poisson distributions and Normal distributions. Concept of joint probability, Joint probability distributions

UNIT–IV	10 Hrs.

Markov chains: Introduction, Probability vectors, Stochastic Matrices, Fixed Points and Regular stochastic Matrices, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains and absorbing states.

Reference Books *

1. Steven C Chapra& Raymond P Canale, Numerical Methods for Engineers
2. Dr. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi
3. H. K. Das, Advanced Engineering Mathematics, S. Chand & company Ltd. Ram Nagar, New Delh
4. E Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
5. Roy D. Yates and David J. Goodman, Probability and stochastic processes, 2nd edition 2012,Wiley India pvt.ltd
6. Seymour Lipschutz, Theory and problems of probability, Schaum's Series)

Course Outcomes**

After completion of the course student will be able to

1. Apply the least square sense method to construct the specific relation for the given group of data.
2. Solve problems on correlation and regression
3. Apply the concepts of probability
4. Apply the concepts of probability distributions
5. Apply the concept of Markov Chain for commercial and industry purpose

*** Books to be listed as per the format with decreasing level of coverage of syllabus**

**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2													
CO2	1	2													
CO3	1														
CO4	1														
CO5	1														

21UCS409C	Database Management Systems	Credits:-03
L:T:P – 2:2:0		CIE Marks: 50
Total Hours/Week: 04		SEE Marks: 50

UNIT-I	10 Hrs.

Databases and database users:
Introduction; an example, Characteristics of Database approach; Actors on the scene, Workers behind the
scene. Advantages of using the DBMS approach.

Database System Concepts and Architecture:
Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment.

Data modelling using the Entity relationship model (ER Model):
Using High-Level Conceptual Data Models for Database Design; An sample Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design for COMPANY database; ER Diagrams, Naming Conventions.

UNIT–II	10 Hrs.

Relational data Model and Relational Database constraints:
Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations.

Relational Database Design Using ER to Relational Mapping:

Relational algebra and Relational Calculus:
Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra.

UNIT–III	10 Hrs.

Basic SQL:
SQL Data Definition and Data Types, Specifying Basic Constraints in SQL, Basic retrieval Queries in SQL. INSERT,DELETE and UPDATE statements in SQL.

More SQL: Complex queries,Triggers,Views and schema modification:
More Complex SQL Queries, Views(Virtual Table in SQL).Schema Change Statement in SQL.

Basics of Functional Dependencies and Normalization for Relational Databases:
Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form; Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form.

UNIT–IV	10 Hrs.

Relational Database Design Algorithms and Further Dependencies:
Further topics in functional dependencies: Inference rules, equivalence, and minimal cover. Properties of relational decompositions.

Introduction to Transaction Processing Concepts and Theory:

Introduction to transaction processing; Transaction and System concepts; Desirable Properties of transaction; Characterizing Schedules Based on Recoverability; Characterizing Schedules Based on Serializabilty.

Concurrency Control Techniques:

Two-Phase Locking Technique for concurrency Control(2PL).

Reference Books *

1. Elmasri and Navathe, Fundamentals of Database Systems , 7th Edition, 2018, Addison-Wesley
2. Silberschatz, Korth and Sudharshan, Database System Concepts5th Edition,
3. 2006, Mc-GrawHill
4. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, 3rd Edition, 2014, TATA McrawHill

Course Outcomes**

After completion of the course student will be able to

1. Explain the concepts of database management system and OLTP.
2. Model Entity-Relationship diagrams for enterprise level databases.
3. Formulate Queries using SQL and Relational Formal Query Languages.
4. Apply normalization concepts to refine designed database.
5. Design and develop database application for real life problem

*** Books to be listed as per the format with decreasing level of coverage of syllabus**

**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3											2			
CO2		3	3		2							2	3		2
CO3	2	3	3	2	3							2	3		3
CO4	2	3	3						3		3	2	3		3
CO5	2	2	3	3	3						2	2	3		3

21UCS402C	Operating Systems	Credits:-03
L:T:P – 2:2:0		CIE Marks: 50
Total Hours/Week: 04		SEE Marks: 50

UNIT-I	12 Hrs.

Introduction: What Operating Systems Do, Computer-System Organization, Computer-System Architecture. Operating-System Operations, Resource Management, Security and Protection Virtualization, Distributed Systems, Computing Environments.

PROCESS: Processes Process Concept, Process Scheduling, operations on Processes, Interposes Communication, IPC in Shared-Memory Systems, IPC in Message-passing Systems.

Threads & Concurrency: overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multi-Processor Scheduling, Real-Time CPU Scheduling, Operating-System Examples, Algorithm Evaluation

UNIT–II	12 Hrs.

Synchronization Tools: Background, The Critical-Section Problem, Peterson's Solution, Hardware Support for Synchronization, Mutex Locks, Semaphores, Monitors, Liveness, Evaluation, Classic problems of synchronization.

Deadlocks: System Model, Deadlock in Multithreaded Applications, Deadlock Characterization, Methods for Handling Deadlocks, Methods for Handling Deadlocks, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT–III	12 Hrs.

Main Memory: Background, Contiguous Memory Allocation, Paging Structure of the Page Table, Swapping, Example: Intel 32- and 64-bit Architectures,

Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing

UNIT–IV	12 Hrs.

File-System Interface: File Concept, Access Methods, Directory Structure, Protection, Memory-Mapped Files

File-System Implementation: File-System Structure, File-System Operations, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery, Example: The WAFL File System

File-System Internals: File Systems, File-System Mounting, Partitions and Mounting ,File Sharing, Virtual File Systems Remote File Systems , Consistency Semantics

Reference Books *

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Concepts, Tenth Edition, 2018, John Wiley & Sons, Inc .ISBN 978-1-118-06333-0
2. D. M. Dhamdhere , Operating Systems--A Concept Based Approach, 3rd Edition,2013, McGraw-

Hill

3. Andrew S. Tanenbaum and Herbert Bos, Modern Operating Systems , 4th edition,2014, Pearson
4. P.C.P. Bhatt, An Introduction to Operating Systems , 4th Edition2014 ,PHI(EEE),
5. William Staling, Operating Systems: Internals and Design Principles , 9th Edition,2019 ,Pearson

Course Outcomes**

After completion of the course student will be able to

1. List and explain goals, service, and functions of different classes of operating systems.
2. Analyse the performances of different process scheduling, memory management, file system implementation, protection, and security mechanisms.
3. Apply scheduling and memory allocation policies for solving scheduling and memory management problems.
4. Develop simple concurrent applications using processes and threads
5. Explain mechanisms for deadlock handling, synchronization and interprocess communication.

*** Books to be listed as per the format with decreasing level of coverage of syllabus**

**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1	1									1	1		
CO2		3	2									1	1		
CO3	1		3									1	1		1
CO4	2	1	3									1	1		3
CO5	1	2	2									1			2

21UCS403C	Object Oriented Programming With Java	Credits:-03
L:T:P – 3:0:0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Java Programming Fundamentals: Object Oriented programming features
History and evolution of Java: Java's lineage, bytecode , Java Buzzwords**.**
An overview of Java ,Data Types, Variables and Arrays , Operators , Control Statements
Introducing Classes: Class Fundamentals , Declaring Objects , Introducing Methods , Constructors ,this keyword ,garbage collection, method overloading.

UNIT–II	10 Hrs.

Inheritance , Packages and Interfaces
String Handling , Type wrappers
Exception Handling : Exception-Handling Fundamentals – Exception Classes , Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, Nested try Statements, throw and finally statements.

UNIT–III	10 Hrs.

Lambda Expressions : Fundamentals, Block Lambda expressions, Passing Lambda Expressions as argument, Lambda Expressions and Exceptions .
Multithreaded Programming : The Java Thread Model , The Main Thread , Creating a Thread, Creating Multiple Threads, Using isAlive( ) and join() , Thread Priorities , Synchronization , Suspending, Resuming and Stopping Threads

UNIT–IV	10 Hrs.

JAVA 2 ENTERPRISE EDITION OVERVIEW, DATABASE ACCESS: Overview of J2EE and J2SE. The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement; ResultSet Objects

Reference Books *

1. Herbert Schildt , Java The Complete Reference , 9th Edition,2014, MGH Education
2. Jim Keogh, J2EE - The Complete Reference, 2007,Tata McGraw Hill
3. Cay S Horstmann ,Gary Cornell, Core Java Volume 1- Fundamentals, 8th Edition, 2007,Pearson Education
4. E Balagurusamy, Programming with Java , 6th Edition, 2019, MGH Education

Course Outcomes**

After completion of the course student will be able to

1. Acquire knowledge of underlying concepts of object oriented programming.
2. Design Classes and establish relationship among Classes for various applications from problem definition
3. Demonstrate the creation & use of Packages & Interfaces and incorporate thread concepts to develop multithreaded programs in Java.
4. Use Exception handling, polymorphism and inheritance to develop Java programs.
5. Design and develop simple applications using Java and JDBC.

Books to be listed as per the format with decreasing level of coverage of syllabus
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1		1										**3**			
CO2		3	2	**1**								**3**	**2**		**2**
CO3	2	3	3		3							**3**	**2**		**2**
CO4	2	3	3		3							**3**	**2**		**2**
CO5	2	3	3		3							**3**	3	**1**	**3**

21UCS404C	Finite Automata And Formal Languages	Credits:-03
L:T:P – 3:0:0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Introduction to the Theory of Computation: Three Basic Concepts Languages Grammars Automata, Some Applications.

Deterministic Finite Accepters: Deterministic Accepters and Transition Graphs, Languages and Dfa's, Regular Languages.

Nondeterministic Finite Accepters: Definition of a Nondeterministic Accepter

Equivalence of Deterministic and Nondeterministic Finite Accepters, Reduction of the Number of States in Finite Automata

UNIT–II	10 Hrs.

Regular Languages and Regular Grammars: Regular expressions; Formal Definition of a Regular Expression, Languages Associated with Regular Expressions.

Connection between Regular Expression and Regular Languages: Regular Expressions Denote Regular Languages, Regular Expressions for Regular Languages.

Regular Grammars: Right- and Left-Linear Grammars, Right-Linear Grammars for Regular Languages **Properties of Regular Languages:** Closure under Simple Set Operations, Closure under Other Operations; Identifying Nonregular Languages: A Pumping Lemma.

UNIT–III	10 Hrs.

Context-Free Languages: Context-Free Grammars; Examples of Context-Free Languages, Leftmost and Rightmost Derivations, Derivation Trees.

Parsing and Ambiguity: Ambiguity in Grammars and Languages

Simplification of Context-Free Grammars and Normal Forms: A Useful Substitution Rule, Removing Useless Productions, Removing λ-Productions, Removing Unit-Productions .

Two Important Normal Forms: Chomsky Normal Form, Greibach Normal Form.

UNIT–IV	10 Hrs.

Pushdown Automata: Nondeterministic Pushdown Automata: Definition of a Pushdown Automaton, The Language Accepted by a Pushdown Automaton.

Pushdown Automata and Context-Free Languages: Pushdown Automata for Context-Free Languages, Context-Free Grammars for Pushdown Automata.

Turing Machines: Definition of a Turing Machine, Turing Machines as Language Accepters, Turing Machines as Transducers.**Turing Machine with More Complex Storage:**Multitape and Multidimensional Turing Machines.

Reference Books *

1. Peter Linz, Introduction to Formal Languages and Automata, 6th Edition,Jones and Bartlett Student Edition
2. Hopcroft, Motwani, and Ullman, Introduction to Automata Theory, Languages, and Computation, 3rd Edition, Pearson Education India
3. Michael Sipser, Introduction to the Theory of Computation, 3rd Edition, Cengage Learning
4. E Rich , Automata, Computability and Complexity: Theory and Applications, 1st Edition, 2012, Pearson Education India
5. Martin, John C, Introduction to languages and the theory of computation 4th Edition, 2013,

McGraw-Hill

6. K L P Mishra, N Chandrasekaran, Theory of Computer Science,, 3rd Edition, 2012,PHI Learning Pvt. Ltd.

Course Outcomes**

After completion of the course student will be able to

1. Demonstrate a fundamental knowledge of the core concepts in automata theory and formal languages.
2. Prove the properties of languages, grammars and automata with formal mathematical methods;
3. Analyse the closure properties of regular and context-free languages.
4. Design finite automata, pushdown automata, Turing machines for solving language pattern recognition problems.
5. Apply mathematical and formal techniques for solving problems in Computer Science.

*** Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	3	**3**									**3**		
CO2	3	2	2	**3**											
CO3	1	3	3	**2**	1								**3**		
CO4	3	2	3	**2**	2										
CO5	1	2	1	**33**											

21UCS405L	Database Management System Lab	Credits:-01
L:T:P – 0:0:2		CIE Marks: 50
Total Hours/Week: 02		SEE Marks: 50

Assignment List

Design the Database for any one of the following applications and implement the SQL Queries on any one of the database given below.

a) Banking System,
b) Employee Organization
c) Inventory Processing System
d) Library Management

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) using CREATE, ALTER, DROP, INSERT statements.
2. Implement the queries for Updation, Selection, Deletion operations. Use ROLL BACK, COMMIT & SAVE POINTS Concepts with UPDATE, SELECT, DELETE statements.
3. Implement the queries (along with sub Queries) using JOIN CONDITION,BETWEEN,IN,LIKE ANY, ALL, DISTINCT, EXISTS, NOTEXISTS, UNION, INTERSECT EXCEPT,ORDER BY clauses.
4. Implement the queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY and HAVING clauses.
5. Implement the query to create a view and access the content of view and drop the view.
6. Develop PL/SQL program using PROCEDURE.
7. Develop PL/SQL program using FUNCTIONS.
8. Develop PL/SQL program using CURSOR.
9. Develop PL/SQL Programs using TRIGGERS.
10. Develop PL/SQL programs using PACKAGES

Course Outcomes**

After completion of the course student will be able to

1. Create and maintain database using SQL.
2. Query the given database to solve given problem
3. Design database for given application

*** Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3		3				3	1	2	3	3	2	
CO2	2	3	3		3				2	1	2	3	3	2	
CO3	2	3	3		3				3	3	3	3	3	3	

21UCS406L	Object Oriented Programming with Java Lab	Credits:-01
L:T:P – 0:0:2		CIE Marks: 50
Total Hours/Week: 02		SEE Marks: 50

Assignment List

Develop simple java programs to demonstrate the

i) Use of conditional statements
ii) Use of loop statements
iii) Reading & printing different data types in java
iv) Operations on arrays(single & multidimensional

2. Develop simple java programs to demonstrate
   i) Inheritance
   ii) Polymorphism
   iii) Packages
   iv) Interfaces

3. Develop simple java programs to demonstrate exception handling

4. Develop simple java programs to demonstrate multithreading concept
   i) Creating threads using extends & runnable technique
   ii) Synchronization
   iii) Interthread Communication

5. Develop simple java programs that demonstrates the use of
i) String library functions

6. Develop simple JDBC programs
   i) Statement Object
   ii) Prepared Statement Object
   iii) Callable Statement Object.

Course Outcomes**

After completion of the course student will be able to

1. Analyse the problem statement and determine the requirements for solving problem.
2. Design and develop effective solution for the problem given.
3. Utilize modern tools to create java applications to solve real world problems

*** Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	3	3		3							**3**	**3**	**1**	**2**
CO2	2	3	3		3				**2**			**3**	**3**	**1**	**3**
CO3	1	2	2	**1**	3					**1**	**2**	**1**	**1**	**2**	**1**

21UCS407L	Operating Systems Lab	Credits:-01
L:T:P – 0:0:2		CIE Marks: 50
Total Hours/Week: 02		SEE Marks: 50

Assignment List

1. Implementation of scheduling policies
2. Implementation of memory allocation techniques.
3. Developing solutions for deadlock problems.
4. Implementation of page replacement policies.
5. Developing concurrent applications using processes(Petersons algorithm).
6. Demonstration of synchronization using semaphores.
7. Implementation of Unix like shell commands.
8. Developing concurrent applications using Threads.

Course Outcomes**

After completion of the course student will be able to

1. Simulate and demonstrate different functionalities of operating system
2. Implement Unix like Shell commands.
3. Develop simple applications using concurrent programming.

*** Books to be listed as per the format with decreasing level of coverage of syllabus**

**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2										1		3
CO2	2	2	2										1		3
CO3	2	3	3										1		3

21UCS408I	Summer Internship-I	Credits: 02
L:T:P :-		CIE Marks: -
No Of Weeks :3		SEE Marks: 100

Workshop Schedule details

Regular students will undergo Internship after completing first year,
lateral entry students will undergo Internship after completing third semester
Duration :3 weeks
Week 1:Parent department
Week 2 & Week 3 other department

Timing : Morning Session :9.00 am to 1.00 noon
Afternoon Session :2.00 pm to 5.30 pm
Total number of Hours=3weeks*7daya*7 hrs=147 hours

Course content

Sl. No.	Topics	Duration in Days
1	Linux basics, Linux commands, Exercise and Presentation on the topics	1
2	**Strings:** Introduction, Declaring and initializing string variables, String-handling functions, Example programs.	1
3	**User-defined functions:** Introduction, Need for user-defined functions, Elements of user-defined functions, Definition of functions, Return values and their types, Function calls, Function declaration, Category of functions: Based on call by value, call by reference, arguments, and return type and recursion, Example programs.	
4	**Structures:** Defining a structure, declaring structure variables, Accessing structure members, Initialization, Arrays of structure, Arrays within structures, Structures within structures, Example programs.	**1**
5	**Pointers:** Introduction, pointers for Inter-function communication, pointers to pointers, compatibility, Pointer applications, Arrays and pointers, pointer arithmetic and arrays, passing an array to a function, Memory allocation functions, Structures and Pointers, Array of pointers, pointers to void and pointers to functions, Command line arguments, linked lists.	1
6	**Bitwise operators:** Exact size integer types, logical bitwise operators, shift operators, masks, Variable argument list functions	**1**
7	**Files:** Text Input/output: files, streams, standard library I/O functions, formatting I/O functions, character I/O functions Binary files: Text v/s binary stream, standard library function for files, converting file types	

Evaluation Criteria

Sl. No	Component	Marks	Mode of evaluation
1	Week 1	25	Quizzes
2	Week 2	25	Evaluation by other departments with respective parameters/assessment methods
3	Week 3	25	
4	Presentation and Report	25	Presentation by the student, sharing the experience gained through the internship, supported by the report, in the given format.
Total		**100**	

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Course Outcomes**

After completion of the course student will be able to

1. Comprehend and work with the Linux Operating System.
2. Understand C programming concepts like pointers, structures, and files.
3. Apply the knowledge of C programming concepts to implement the given requirement specification to solve simple problems.
4. Implement, interpret, debug and test any given C program.
5. Develop simple applications using advanced C programming concepts to solve simple problems.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1					2				2			2	3		
CO2	3	2												2	
CO3	3	3	3	3					2			2	3	3	2
CO4	3	2	3	3					2			2	3	3	2
CO5		3	3	3								3	3	3	3

21UM400M	Bridge Course Mathematics-I (Mandatory)	Credits: 0
L:T:P – 3:0:0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Differential Equations-1:

Ordinary differential equations of first order**:** Variable separable, Homogeneous. Exact form and reducible to exact differential equations. Linear and Bernoulli's equation.

UNIT–II	10 Hrs.

Differential Equations-2:

Second and higher order linear ODE's with constant coefficients-Inverse differential operator, method of variation of parameters (second order); Cauchy's and Legendre homogeneous equations

UNIT–III	10 Hrs.

Laplace Transform:

Introduction, Definition of Laplace Transform, Laplace Transform of standard functions, Properties: Shifting, differentiation, Integral and division by t. Periodic function, Heaviside's Unit step function.

UNIT–IV	10 Hrs.

Inverse Laplace transforms:

Properties, Convolution theorem-problems, Solutions of linear differential equations

Reference Books *

1. Dr. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 2017
2. E Kreyszig,Advanced Engineering Mathematics, 2014, John Wiley & Sons , Pvt.Ltd
3. Earl D. Rainville and Phillip E, Bedient, Elementary Differential Equations by, Sixth Edition
4. Erwin Kreyszig,Advanced Engineering Mathematics, 2014,John Wiley & Sons

Course Outcomes**

After completion of the course student will be able to

1. Solve first order first degree differential equations.
2. Solve second and higher order linear differential equations.
3. Apply Laplace transforms for standard functions and its properties
4. Apply Inverse Laplace transforms for standard functions
5. Solve differential equations using Laplace transform method

*** Books to be listed as per the format with decreasing level of coverage of syllabus**

**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2													
CO2	1	2													
CO3	1	2													
CO4	1	2													
CO5	1	2													

V Semester B.E. (CSE)

Sl. No.	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION MARKS		
					L	T	P	CIE	SEE	Total
1.	**PCC**	**21UCS501C**	**Analysis and Design of Algorithms**	**3**	**2**	**0**	**2**	**50**	**50**	**100**
2.	**PCC**	**21UCS502C**	**Computer Networks**	4	**4**	0	**0**	**50**	**50**	**100**
3.	**PCC**	**21UCS503C**	**Web Programming**	**3**	**2**	**0**	**2**	**50**	**50**	**100**
4.	**PEC**	**21UCSXXXE** 21UCS065E	**Professional Elective Course - I** Python Application Programming	**3**	**3**	**0**	**0**	**50**	**50**	**100**
5.	**OEC**	**21UCSXXXN**	**Open Elective-I**	**3**	**3**	**0**	**0**	**50**	**50**	**100**
		21UCS531N	**AI and Robotics**							
		21UCS533N	**IOT and Applications**							
6.	**PCC**	**21UCS504L**	**Computer Networks Lab**	**1**	**0**	**0**	**2**	**50**	**50**	**100**
7.	**AEC**	**21UHS521C**	**Quantitative Aptitude and Professional Skills**	**2**	2	**0**	**0**	**50**	**50**	**100**
8.	**INT**	**21UCS505I**	**Summer Internship - II**	3	0	-	-	100	--	**100**
9.	**HSMC**	**21UBT523C**	**Environmental Studies**	**1**	**1**	**0**	**0**	**50**	**50**	**100**
Total				**23**	**17**	0	6	**500**	**400**	**900**

BSC	ESC	HSMC	AEC	PCC	PEC	OEC	PROJ	INT	SEMI	MAN(UHV)
--	--	01	02	11	03	03	--	03	--	--

SUBJECT CODE: 21UCS501C	Analysis and Design of Algorithms	Credits: 3
L:T:P - 2 : 0: 2		CIE Marks: 50
Total Hours/Week: 4		SEE Marks: 50

UNIT-I	06Hrs.

Introduction: Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Fundamental Data Structures. **Fundamentals of the Analysis of Algorithm Efficiency:** Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non-recursive and Recursive Algorithms. **Brute Force:** Selection Sort and Bubble Sort, Sequential Search and Brute-Force String Matching, Exhaustive Search.

UNIT–II	06 Hrs.

Divide and Conquer: Mergesort, Quicksort, Binary Search, Multiplication of large integers and Stressen's Matrix Multiplication.
Decrease and Conquer: Depth First Search, Breadth First Search, Topological Sorting.

UNIT–III	06 Hrs.

Transform and Conquer: Presorting, Balanced Search Trees, Heaps and Heapsort, Problem Reduction **Space and Time Tradeoffs:** Sorting by Counting, Input Enhancement in String Matching **Dynamic Programming:**Warshall's and Floyd's Algorithms. The Knapsack Problem and Memory Functions.

UNIT–IV	06 Hrs.

Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees.
Backtracking: N-Queens Problem, Sum of Subsets, **Branch-and-Bound**.

Reference Books *

3. Levitin A., 2017, Introduction to The Design & Analysis of Algorithms, 3rd Edition, Pearson Education.
4. Cormen T. H., Leiserson C. E., Ronal L., Rivest C. S., Introduction to Algorithms, 2nd Edition, PHI.

Web links and Video Lectures:

1. https://nptel.ac.in/courses/106/106/106106131/
2. https://www.classcentral.com/course/swayam-design-and-analysis-of-algorithms-3984
3. VTU EDUSAT PROGRAMME – 20

Course Outcomes**

After completion of the course student will be able to

1. Analyze and compare the running time of algorithms using asymptotic notations.
2. Demonstrate the working of major algorithms divide-and-conquer and decrease-and-conquer strategies.
3. Design and implement the dynamic programming and greedy strategy paradigm.
4. Demonstrate the working of back tracking and branch-and-bound approaches.
5. Interpret the efficient algorithms in common engineering design situations.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	3	3	-	1	-	-	-	-	-	-	2	-	3	3
CO2	2	3	3	2	3	-	-	-	-	-	-	-	-	2	
CO3	2	2	3	2	3	-	-	-	-	-	-	3	-	3	2
CO4	2	2	3	3	2	-	-	-	-	-	-	-	-	2	-
CO5	2	2	3	2	-	-	-	-	-	-	-	-	3	1	2

21UCS502C	Computer Networks	Credits: 04
L:T:P - 4 : 0 : 0		CIE Marks: 50
Total Hours/Week: 04		SEE Marks: 50

UNIT-I	13 Hrs.

Introduction: Data Communications: Components, Data representations, Data flow, Networks: Distributed Processing, Network Criteria, and Physical structures, Categories of Networks [LAN, WAN, MAN], Protocols and Standards, Key elements.

Network Models: The OSI Model: layered architecture, Peer to peer processes, and encapsulation, Layers in the OSI Model : [Brief description of all seven layers], TCP / IP Protocol Suite, Addressing: physical, logical and port addresses and specific address. Physical Layer: Transmission Impairment, Transmission Modes.

UNIT–II	13 Hrs.

Data Link Layer: Introduction, Block Coding, Error detection and correction: Cyclic codes: Checksum. Data link control: Framing, Flow and Error control, Protocols: Noiseless channels: Noisy channels. Channelization: FDMA, TDMA, CDMA. Connecting Devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Routers, Gateways. Virtual LANs.

UNIT–III	13 Hrs.

Network Layer: Logical Addressing: IPv4 Addresses: Address Space, Notation, Classful Addressing, Classless Addressing, IPv6 Addresses: Structure. Network Layer : Internet Protocol: IPv4 Datagram, IPv6, Transition from IPv4 to IPv6 Network Layer: Address Mapping, Error Reporting: ARP, RARP, BOOTP, DHCP and ICMP. Network Layer: Delivery, Forwarding & Routing: Delivery, Forwarding: Routing Table, Unicast Routing Protocols: Distance Vector Routing, Link State Routing, Path Vector Routing.

UNIT–IV	13 Hrs.

Transport Layer: Process to Process Delivery: UDP: TCP: TCP services, TCP features, Segment, A TCP connection. SCTP: SCTP services, SCTP features, Packet format, An SCTP association. Congestion Control and Quality of Service: Congestion control: Open loop congestion control and closed loop congestion control. Quality of Service.

Application Layer: Domain Name System: Name Space, Domain Name Space, DNS In The Internet, Resolution. Registrars. DDNS. Remote Logging, Electronic Mail and File Transfer:

Remote logging: Telnet, Electronic mail: Architecture, User Agent, MIME, SMTP POP and IMAP. File Transfer: FTP.

Reference Books *

1. Behrouz A. Forouzan, 4thEdition, 2006, "Data Communications and Networking", Tata McGrawHill.
2. Alberto LeonGarcia and Indra Widjaja, 2nd Edition, "Communication Networks – Fundamental Concepts and Key Architectures", Tata McGrawHill.
3. Nader F. Mir, 8th Edition, 2007, "Computer and Communication Networks", Pearson Education.
4. Larry L. Peterson and Bruce S. David, 4thEdition, 2007, "Computer Networks – A Systems Approach, Elsevier.

Course Outcomes**

After completion of the course student will be able to

1. Explain the fundamental concepts of Computer Networks.
2. Analyze different network protocols.
3. Apply techniques for efficient handling of Computer Networks.
4. Formulate Routing and Congestion Control Algorithms.
5. Implement Application Layer protocols.

*** Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	1	3	1	2	1	-	-	-	-	-	-	-	3	-	-
CO3	2	2	3	1	-	-	1	2	-	-	-	-	1	2	3
CO4	1	3	1	3	1	-	-	-	-	-	-	-	3	-	-
CO5	1	2	3	2	-	3	1	1	-	-	-	-	1	2	2

21UCS503C	Web Programming	Credits: 03
L:T:P - 2 : 0: 2		CIE Marks: 50
Total Hours/Week: 40		SEE Marks: 50

UNIT-I	6 Hrs.

Fundamentals: A Brief Introduction to the Internet, The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators.

Introduction to HTML/XHTML : Origins and Evolution of HTML and XHTML, Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists; Tables, **Forms :**TheAudio Element, The Video Element, Organization Elements, The Time Element, Syntactic Differences between HTML and XHTML.

UNIT–II	6 Hrs.

Cascading Style Sheets: Introduction, Levels of Style Sheets, Style Specification Formats, Selector Forms, Property-Value Forms, Font Properties, List Properties, Alignment of Text, Color: The Box Model, Background Images, The span and div Tags, Conflict Resolution.

The Basics of JavaScript: Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics, Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification Arrays, Functions, And Example, Constructors, Pattern Matching Using Regular Expressions.

UNIT–III	7 Hrs.

JavaScript and HTML Documents: The JavaScript Execution Environment**,** The Document Object Model**,** Element Access in JavaScript**,** Events and Event Handling. Handling Events from Body Elements**,** Handling Events from Button Elements Handling Events from Textbox and Password,

Dynamic Documents with JavaScript: Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements.

UNIT–IV	6 Hrs.

Introduction to PHP: Origins and Uses of PHP, Overview of PHP, General Syntactic Characteristics, Primitives, Operations, and Expressions, Output, Control Statements, Arrays, Functions, Pattern Matching, Form Handling ,Cookies, Session Tracking.

Database Access through the Web: Database Access with PHP and MySQL.

List of Experiments

1. Design and develop static web page using HTML and CSS
2. Develop web page to demonstrate Form validation using JavaScript
3. Develop dynamic web pages using javascript
4. PHP program to demonstrate Cookie creation, display and deletion.
5. PHP program to demonstrate session tacking.
6. PHP Program to validate the input data and store the acquired data to database.

7. Design a real world web applications using htlm/css/javascript/php

Reference Books

1. Robert W. Sebesta, Programming the World Wide Web, 8th Edition, Pearson Education 2014.
2. Chris Bates, Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2006.
3. Robin Nixon, Learning PHP, MySQL & JavaScript, 5thEdition, O'Reilly Publications, 2015.

Course Outcomes

After completion of the course student will be able to

1. Explain the basics of World Wide Web.
2. Implement web concepts using different tools like HTML/CSS/JavaScriptPHP.
3. Design dynamic web pages using JavaScript.
4. Design server-side pages using PHP.
5. Develop web application for real world problem.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1														
CO2		3	3		2								1		
CO3		3	3		2								1		
CO4		3	3		2								2		
CO5		3	3		2								2	1	2

UCS065E	Python Application Programming	Credits: 03
L:T:P - 3 : 0 : 0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Datatypes in python: Comments in python, Docstrings, How python sees variables, Datatypes in python, Sequences in python, Literals in python, Determining the data type of a variable, Identifiers and reserved words, Naming conventions in python.

Operators in Python: Operator, operator precedence and associativity, Mathematical functions.

Input and Output: Output statements, Input statements, Command Line arguments.

Control Statements.Stringsand Characters.

UNIT–II	10 Hrs.

Functions: Defining a function, calling a function, Returning Results from a function, Returning multiple values from a function, Formal and actual arguments, local and global variables, passing a group of elements to a function, recursive functions, the special variable name.

Lists and tuples.

Dictionaries.

Exceptions: exceptions, exception handling, types of exceptions, user defined exceptions.

Files in python: files, types of files in python, opening a file, closing a file, working with text files containing strings, working with binary files, pickle in python.

UNIT–III	10 Hrs.

Regular Expressions in python.

Object Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism

Networking in python.

UNIT–IV	10 Hrs.

Threads.

Graphical user Interfaces.

How to work with Database: How to use SQLite Manager to work with a database, how to use python to work with database.

Reference Books *

1. Dr. R. Nageswar Rao, 2nd Edition 2018, Core "Python Programming", Dreamtech Press. (Chapter Numbers:3,4,5,6,8,9,10,11,16,17,18,21,22,23,24)
2. Gowrishankar S. & Veena A., 1st Edition 2019, Introduction to Python Programming, CRC Press Taylor & Francis Group. (Chapter Number:11)
3. Michael Urban and Joel Murach, 1st Edition 2016, "Python Programming", Mike Murach Elizabeth Drake. (Chapter Number:17)

4. B. NageshRao Python, 1st May 2017, "Learning Python", Cyberplus Publication.
5. Wesley J. Chun, 3rd Edition 2015, "Core Python Applications Programming", Pearson Education India.
6. Michael Dawson, 3rd Edition 2010, "Python Programming for the Absolute Beginner", Delmar Cengage Learning.
7. Reema Thareja, 1st Edition 2017, "Python Programming using problem solving approach", Oxford university press.
8. Charles R. Severance, 1st Edition 2016, "Python for Everybody: Exploring Data Using Python 3", Create Space Independent Publishing Platform.

Course Outcomes**

After completion of the course student will be able to

1. Explain syntax and semantics of different statements and functions in Python.
2. Demonstrate the use of strings, files, lists, dictionaries, and tuples in simple applications.
3. Write simple applications using regular expressions, multiple threads.
4. Build simple database applications with GUI.
5. Analyze the given problem and select appropriate data types and modules to develop the solution.

* **Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2	2	-	1	-	-	-	-	-	-	-	2	-	-
CO2	2	3	3	-	1	-	-	-	-	-	-	-	3	1	1
CO3	3	3	3	-	1	-	-	-	-	-	-	-	3	1	1
CO4	3	3	3	-	1	-	-	-	-	-	-	-	3	1	3
CO5	2	3	1	-	1	-	-	-	-	-	-	-	3	1	1

UCS531N	ARTIFICIAL INTELLIGENCE AND ROBOTICS	**Credits: 03**
L:T:P – 3:0:0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT- I (10 hours)

1. Introduction to AI: The AI Problems, Underlying assumptions, AI technique, Level of the model, Criteria for success(1.1to 1.5fromRich and Knight)

2. Problems: Problem spaces and search Problem as a state space search, Production systems, Problem characteristics, Production system characteristics, Issues in the design of search problems, additional problems(2.1 to 2.6fromRich and Knight)

UNIT-II (10hours)

3. Search and control Strategies: Introduction, Generate and Test, Hill Climbing, Simulated annealing(3.1, 3.2fromRich and Knight)

4. Expert systems Architectures: Introduction, Rule-Based System Architectures, Nonproduction System Architectures, Dealing with Uncertainty, Knowledge Acquisition and Validation (15.1 to 15.6from Dan W. Patterson)

UNIT-III (10hours)

5. Introduction to Robotics: The Seven Criteria of Defining a Robot, Robot Categories, Sensors, Actuators, End Effectors, Controllers, Scenario, Giving the robot instructions. (Chapter 1 from Cameron Hughes)

6. Robot Vocabularies and RSVP: Additional Effort, Actions, The Autonomous Robot's ROLL Model, RSVP(Robot Scenario Visual Planning): Mapping the Scenario, Pseudocode and Flowcharting RSVP. (Chapter 2 and 3 from Cameron Hughes)

UNIT-IV (10 hours)

7. Actual Capabilities of Robot: The Reality Check for the Microcontroller, Sensor Reality Check, Determine Your Robot's Sensor, Limitations, Actuators End-Effectors Reality Check. (Chapter 4 from Cameron Hughes) **Sensors:** Types of Sensors, Sensor Interfacing with Microcontrollers ,Attributes of Sensors, Sensor Calibration. (Chapter 5 from Cameron Hughes)

Reference Books *

1. **Artificial Intelligence: A modern approach Stuart Russell and Peter Norvig Pearson Education, India 3rdEdition,2016**
2. **Artificial Intelligence Saroj Kaushik Cengage Learning India 1st Edition, 2011**
3. **Introduction to AI Robotics Robin R. Murphy MIT Press 1stEdition,2000**
4. **Introduction to Robotics Saha S.K. TMH Publications 1stEdition,2008**

Course outcomes **

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

1: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation and learning

2: Demonstrate proficiency developing applications in AI.
3: Develop expert systems to solve complex problems in different domains.
4: Select the appropriate sensors, motors, end-effectors and microcontrollers for a given robot.
5: Program a robot to perform tasks in industrial applications.

* **Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	**Programme Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1		3		3									1		
CO2			3											2	
CO3						1									
CO4				3											3
CO5					3							2		3	

UCS0633N	Internet Of Things and Applications	Credits: 03
L:T:P – 3:0:0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Introduction to Internet of Things, Definition and Characteristics of IoT, Physical Design of IoT, IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies, Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates, Internet of things application examples: Overview, Smart metering /Advanced metering infrastructure, ehealth/ Body area networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Tracking.

UNIT–II	10 Hrs.

Fundamental IOT Mechanism and Key Technologies: Identification of IOT objects and services, structural aspects of the IOT, Key IOT Technologies, Evolving IOT standards overview and approaches, IETF IPv6 routing protocol for RPL Roll, Constrained application protocol, Representational state transfer, ETSI M2M, Third generation partnership Project service requirement for machine type communication, CENE\EC, IETF IPv6 over lower power WPAN, Zigbee IP(ZIP), IPSO(IP in smart object.

UNIT–III	10 Hrs.

Layer ½ Connectivity: Wireless technologies for the IOT, WPAN technologies for IOT/M2M, Cellular and mobile network technologies for IOT/M2M. Layer3 Connectivity, IPv6 technologies for the IOT: Overview and Motivations, Address Capabilities, IPv6 protocol Overview, IPv6 Tunelling, Ipsec in IPV6 Header Compression Schemes, Quality of service in IPv6, Migration Strategies to IPv6

UNIT–IV	10 Hrs.

IOT Platforms Design Methodology: Introduction, IOT design methodology, Case Study on IOT System for Weather Monitoring, , IOT Systems- Logical design. **IOT physical devices and Endpoints:** What is an IOT device, Raspberry Pi, About the board, Linux on Raspberry Pi, Raspberry Pi interfaces.**IOT Physical Servers and Cloud Offerings:** Introduction to Cloud storage models and communication APIS,WAMP-AutoBahn for IOT, Cloud for IOT, Application Framework . Case Studies illustrating IOT design: Home Automation etc.

Reference Books *

Arshdeep Bahga and Vijay Madisetti, **A Hands-on Approach,** Internet of Things, 2015, Universities Press , ISBN:978-81-7371-954-7

Daniel Minoli, Building the Internet of Things with IPv6 and MIPv6:The Evolving World of M2M Communications, 2013. Wiley ISBN:9781118473474

Michael Miller, **The Internet of Things,** First Edition, Pearson

Claire Rowland, Elizabeth Goodman et.al, Designing Connected Products, First Edition, First Edition ,O'Reilly

Matt Richardson & Shawn Wallace, **Getting Started with Raspberry Pi,** (SPD), 2014, O'Reilly

Michael McRoberts, **Beginning Arduino,** 2nd edition.Technology in action

Course Outcomes**

After completion of the course student will be able to

1. **Describe** the essentials of IOT
2. **Analyze**the various models of IoT design
3. **Examine** the design methodology of IOT and logical design using tools
4. **Develop** a Portable IOT using Raspberry
5. **Identify** Physical devices required to deploy on IOT application and connect to the cloud for real time scenarios

*** Books to be listed as per the format with decreasing level of coverage of syllabus**

**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	--	--	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**
CO2	--	2	3	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**
CO3	--	2	2	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**
CO4	1	2	3	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**
CO5	--	--	3	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**

21UCS504L	Computer Networks Laboratory	Credits:-01
L:T:P – 0:0:2		CIE Marks: 50
Total Hours/Week: 02		SEE Marks: 50

Assignment List

PART –A

Simulation Exercises

Introduction Part

Introduce students to network simulation through the Network simulation Package, Create a simple network model with multiple scenarios, Collect statistics on network performance through the use of simulator tools, Analyze and draw conclusion on network performance

1. Simulate point-to-point network and study how the loss, utilization and transmission of wireless LAN (IEEE 802.11b) network varies as the distance between access point and wireless nodes.
2. Simulate point-to-point network and study network performance analysis of different scheduling technique like First In Out (FIFO), Priority, Round Robin, Weight Fair Queue (WFQ) using NetSim.
3. Simulate and study the throughputs of slow start, Congestion avoidance (also known as Old Tahoe) and First Retransmit (also known as Tahoe), Congestion Control Algorithms during client-server TCP downloads.

PART – B

Implement the following in C/C++:

1. Write a C program to implement the parity generator and checker code from a give bit pattern.
2. For the given data, use CRC-CCITT polynomial to obtain CRC-16 code. Verify the program for the cases: a. without error b. With error
3. Write a program for hamming code generation for error detection and correction.
4. Write a program for distance vector algorithm to find suitable path for transmission.
5. Write a program for congestion control using leaky bucket algorithm.
6. Using TCP / IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents to the requested file if present.
7. Write a client-server application for chat using UDP.
8. Write a program for simple RSA algorithm to encrypt and decrypt the data.

Course Outcomes**

After completion of the course student will be able to

1. Simulate the network with different configurations to measure the performance parameters.
2. Analyze error detection and error correction codes.
3. Analyze routing algorithm to find the suitable path for transmission and control of flowrate.
4. Enable secure communication between the peers using TCP/IP sockets and UDP sockets.

*** Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	**3**	2	-	**2**					**2**	**1**	**2**	**1**
CO2		3	3	**3**	3	1	**3**					**2**	**1**	**2**	**3**
CO3	1	3	3	**3**	1	1	**2**					**2**	**1**	**2**	**3**
CO4		3	3	**2**	3	1	**2**		2			**2**	**1**	**3**	**2**

21UHS521C	Quantitative Aptitude And Professional Skills	Credits: 02
L:T:P - 2 : 0 : 0		CIE Marks: 50
Total Hours/Week: 02		SEE Marks: 50

UNIT-I	07 Hrs.
Vocabulary Development: Vocabulary Building Techniques, Root Words, Antonyms & Synonyms, Sentence Completion, Error Detection & Correction, Reading Comprehension	
UNIT–II	**07 Hrs.**
Numbers, Proportion & Finance: Number System, Factors & Multiples, The God of Math – Linear Equations, Ratio-Proportion-Variation, Percentages, Profit & Loss, Interest, Averages &Alligations	
UNIT–III	**06 Hrs.**
Time & Probability: Time & Work, Time Speed, & Distance, Permutations & Combinations, Probabilit	
UNIT–IV	**06 Hrs.**
Verbal, Analytical, and Visual Reasoning: Human Relations, Direction Tests, Coding Decoding, Clocks and Calendars, Visual Reasoning, Analytical Puzzles, Mathematical, Arrangement & Classification Puzzles	

Reference Books *

1. R. S. Aggarwal, "A Modern Approach to Verbal and Non – Verbal Reasoning", Sultan Chand and Sons, New Delhi, 2018
2. R. S. Aggarwal, "Quantitative Aptitude", Sultan Chand and Sons, New Delhi, 2018
3. Chopra, "Verbal and Non – Verbal Reasoning", MacMillan India
4. M Tyra, "Magical Book on Quicker Maths", BSC Publications, 2018
5. George J Summers, "The Great Book of Puzzles & Teasers", Jaico Publishing House, 1989
6. Shakuntala Devi , "Puzzles to Puzzle You", Orient Paper Backs, New Delhi, 1976
7. R. S. Aggarwal, "A Modern Approach to Logical Reasoning", Sultan Chand and Sons, New Delhi, 2018
8. Cambridge Advanced Learner's Dictionary, Cambridge University Press. Kaplan's GRE guide

Course Outcomes**

After completion of the course student will be able to

1. Enhanced his/her vocabulary and learnt techniques to augment it further
2. Learned the techniques to augment his/her verbal ability
3. Understood step-by-analysis of the given problem and learnt to develop a method for solving it
4. Enhanced and augmented his/her ability to work with quantitative problems

* **Books to be listed as per the format with decreasing level of coverage of syllabus**
** **Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		1							2	3		1			
CO2		1							2	3					
CO3		2	2	3								1			
CO4		1		2							2	1			

21UHS505I	SUMMER INTERNSHIP - II	Credits: 03
L:T:P -: -----		CIE Marks: 70
Total Hours/Week: --		SEE Marks: 30

Internship:

Students need to meet following criteria to successfully complete the internship course.

Components of Internship

1. Student's Diary/ Daily Log :

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completionof the training. It will be evaluated based on the following criteria:

- Regularity in maintenance of the diary.
- Adequacy & quality of information recorded.
- Drawings, sketches, and data recorded.
- Thought process and recording techniques used.
- Organization of the information.

2. Internship Report:

The Internship report will be evaluated based on following criteria:

- Originality.
- Internship certificate from the industry.
- Adequacy and purposeful write-up.
- Organization, format, drawings, sketches, style, language etc.
- Variety and relevance of learning experience.
- Practical applications, relationships with basic theory and concepts taught in the course

Evaluation:

The industrial training of the students will be evaluated in three stages:

1. Evaluation by Industry.
2. Evaluation through seminar presentation
3. Viva-voce at the Institute.

Evaluation Through Seminar Presentation/Viva-Voce at The Institute

The student has to give a seminar based on his/her training, before an expert committee constituted by theconcerned department as per normsof the institute. The evaluation will be based on the following criteria:

- Quality of content presented.
- Proper planning for presentation.
- Effectiveness of presentation.
- Depth of knowledge and skills.
- Attendance record, daily diary, departmentalreports shall also be analysed along with the Internship Report

Evaluation Criteria

Summary of Internship Evaluation	
Guide at the Industry	
Evaluation Criteria	**Marks**
Quality of Work	10
Ability to Learn	10
Initiative and Creativity	10
Character Traits	10
Dependability	10
Organizational Fit	10
Response to Supervision	10
Total(A)	**70**
Department Committee(Faculty Advisor+External+HoD/Nominee)	
Demonstration of experience	10
Report	10
Presentation	10
Total(B)	**30**
Total Score(A + B)	**100**

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Reference Books *

Course Outcomes**

After completion of the course student will be able to

1. Demonstrate the skills gained during the internship at the industry, through simulation/actual implementation.
2. Solve simple real time problems associated in their field of internship.
3. Exhibit abilities to use theoretical concepts in solving practical problems in their field of study.
4. Document and present technical matter to fellow colleagues effortlessly.

*** Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2	3	3	3	1	3	3	3	3	1	1	1
CO2	3	2	2	2	3	3	3	1	3	3	3	3	1	1	1
CO3	3	2	2	2	3	3	3	1	3	3	3	3	1	1	1
CO4	3	2	2	2	3	3	3	1	3	3	3	3	1	1	1

21UBT523C	Environmental Studies	Credits: 03
L:T:P - 1 : 0 : 0		CIE Marks: 50
Total Hours/Week: 01		SEE Marks: 50

UNIT-I	4 Hrs.

Natural Resources: Human activities and their impacts. Energy: Solar energy, Wind energy, Hydropower, Tidal energy, Ocean thermal energy, Geo thermal energy, Biomass energy, Biogas, Biodiesel, Bioethanol, Hydrogen as fuel. Non renewable Energy: Coal, Petroleum, Natural gas, Nuclear energy.

UNIT–II	4 Hrs.

Environmental Pollution: Water pollution, water quality standards, water borne diseases, Fluoride problem, Air pollution, Noise pollution. Effect of electromagnetic waves. Sustainable future: Concept of sustainable development, threats to sustainability, strategies for sustainable development. Environment economics – concept of green building, clean development mechanism (CDM).

UNIT–III	4 Hrs.

Current Environmental Issues of concern: 03 hours Greenhouse Effect- Greenhouse gases and Global Warming, Climate change, ozone layer depletion, Acid rain, Eutrophication, Environmental policy legislation rules & regulations

UNIT–IV	4 Hrs.

Fundamentals of Waste management: 04 hours Solid waste management: Sources, classification, characteristics, collection & transportation, disposal, and processing methods. Hazardous waste management and handling. Concept of waste water treatment, Bioremediation, Industrial waste management (Case studies: Cement, plastic, chemical, E–waste, food & construction industry waste management

Reference Books *

1. Benny Joseph "Environmental Studies" Tata McGraw Hill, 2005
2. Dr. D. L. Manjunath, "Environmental Studies" Pearson Education, 2006
3. Koushik and Koushik "Environmental Science & Engineering" New Age International Publishers, New Delhi, 2006
4. Meenakshi "Environmental Science & Engineering" Pranticce Hall of India, 2006

Course Outcomes**

After completion of the course student will be able to

1.Ability to recognize natural resources and its uses.
2. Able to understand pollution and its effects on environment and to implement sustainable future in the work place.
3. Ability to understand current environmental issues.
4. Able to apply the waste management techniques in various fields

*** Books to be listed as per the format with decreasing level of coverage of syllabus**
**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	1	--	--	--	2	3	-	-	-	-	3	1	--	--
CO2	2	-	-	-	-	-	3	--	--	--	--	3	1	--	--
CO3	--	2				2	2					3	1		
CO4				1		2	2	1				3	1		1

VI Semester B.E. (CSE)

Sl. No	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION MARKS		
					L	T	P	CIE	SEE	Total
	HSMC	21UHS600M	Indian Knowledge System	1	1	0	0	50	50	100
1.	BSC	21UCS601C	Theory of Computation (DMS)	3	3	0	0	50	50	100
2.	PCC	21UCS602C	Compiler Design	4	4	0	0	50	50	100
3.	PCC	21UCS603C	Machine Learning	3	3	0	0	50	50	100
4.	PEC	21UCSXXXE 21UCS036E	Professional Elective Course - II Adhoc Wireless Networks	3	3	0	0	50	50	100
5.	OEC	21UCSXXXN	Open Elective – II	3	3	0	0	50	50	100
		21UCS631N	Machine learning Using Python							
		21UCS634N	Software Engineering							
6.	OEC	21UCSXXXN	Open Elective – III	3	3	0	0	50	50	100
7.	PCC	21UCS604L	Machine Learning Lab	1	0	0	2	50	50	100
8.	MP	21UCS605P	Mini Project	2	0	0	4	50	50	100
Total				23	19	0	6	400	400	800

BSC	ESC	HSMC	AEC	PCC	PEC	OEC	PROJ	INT	SEMI	MAN(UHV)
03	--	--	---	08	03	06	02	--	--	--

21UHS600M	**Indian Knowledge Systems** (Common to All Branches)	**Credit:01**
Hrs/Week: 1:0:0		**CIE Marks:**50
Total Hours: 15Hrs		**SEE Marks:**50

UNIT - I	**3Hrs**

Indian Knowledge Systems (IKS)

Overview, Vedic Corpus, Philosophy, Character, scope and importance, traditional knowledge vis-à-vis Indigenous knowledge, traditional knowledge vs. western knowledge.

UNIT – II	**4Hrs**

Traditional Knowledge in Mathematics and Humanities

Introduction to Indian Mathematics, Unique aspects of Indian Mathematics, Indian Mathematicians and their

Contribution. Number Systems and Units of Measurement.

Linguistics, Art, Craft and Trade in India.

UNIT - III	**4Hrs**

Traditional Knowledge in Physics and Chemistry

Measurements for time, distance and weight, Astronomy, Indian contributions in astronomy, Astrology, the celestial coordinate system, Elements of the Indian calendar, Notion of years and month, Pañcāṅga – The Indian calendar system.

Metals and Metalworking: The rise and fall of a great Indian technology, Mining and ore extraction, Zinc extraction, Copper and it's alloys, Iron and steel in ancient India

UNIT - IV	**4Hrs**

Traditional Knowledge in Professional domain

Town Planning and Architecture, Agriculture, Governance and Public Administration, United Nations sustainable development goals

Reference books:

1. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavana R.N. "Introduction to Indian Knowledge System: Concepts and Applications", PHI Learning Private Ltd. Delhi (2022**).** Pride of India: A Glimpse into India's Scientific Heritage, Samskrita Bharati, New Delhi.
2. Sampad and Vijay "The Wonder that is Sanskrit", Sri Aurobindo Society, Puducherry. (2011).
3. Acarya, P.K. Indian Architecture, Munshiram Manoharlal Publishers, New Delhi. (1996).

4. Kapoor Kapil, Singh Avadhesh “Indian Knowledge Systems Vol – I & II”, Indian Institute of Advanced Study, Shimla, H.P. (2021).

5. Dasgupta,S. A History of Indian Philosophy- Volume 1, Motilal Banarsidass, New Delhi. (1975).

6. PLofker, K. (1963). Mathematics in India, Princeton University Press, New Jeresy, USA"

Suggested Web Links:

1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/121106003/
3. http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63

(Centre of Excellence for Indian Knowledge System, IIT Kharagpur)

4. https://www.wipo.int/pressroom/en/briefs/tk_ip.html
5. https://unctad.org/system/files/official-document/ditcted10_en.pdf
6. http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf

developmentgoals/?gclid=EAIaIQobChMInpJtb_p8gIVTeN3Ch2

7. https://unfoundation.org/what-we-do/issues/sustainable-developmentgoals/?gclid=EAIaIQobChMInp-Jtb_p8gIVTeN3Ch27LAmPEAAYASAAEgIm1vD_BwELAmPEAAYASAAEgIm1vD_BwE

Course Outcomes:

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

CO1: Provide an overview of the concept of the Indian Knowledge System and its importance

CO2: Appreciate the need and importance of protecting traditional knowledge.

CO3: Recognize the relevance of Traditional knowledge in different domains.

CO4: Establish the significance of Indian Knowledge systems in the contemporary world.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2							3				1	1		
CO2						2							1		
CO3			2	2									1		
CO4						3	2						1		

21UCS601C	Theory Of Computation	Credits: 03
L:T:P - 3 : 0 : 0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Fundamentals of Logic: Basic Connectives and Truth Tables, Logic Equivalence – The Laws of Logic, Logical Implication – Rules of Inference, The Use of Quantifiers, Quantifiers, definitions, and the Proofs of Theorems.

UNIT–II	10 Hrs.

Set theory, Relations, and Functions: Sets and subsets, Set Operations and the Laws of Set Theory, Cartesian Products and Relations, Properties of Relations, Computer Recognition-Zero-One Matrices and Directed Graphs, Partial Orders – Hasse Diagrams, Equivalence relations and Partitions.

UNIT–III	10 Hrs.

Functions – Plain and One-to-One, Onto Functions – Stirling Numbers of the Second Kind, Special Functions, The Pigeon-hole Principle, Function Composition and Inverse Functions.

Introduction to Graphs: Definition of Graph, Application of graphs, Finite and Infinite Graphs, Incidence and degree, Isolated Vertex, Pendant Vertex and Null graph. Paths and circuits: Isomorphism, Subgraphs, Walks, Paths and Circuits.

UNIT–IV	10 Hrs.

Connected graphs, Disconnected graphs, Components, Euler graphs, Operations on graphs, Hamiltonian Paths and Circuits, Traveling Salesman Problem. Trees and Fundamental Circuits: Trees, Properties of Trees, Pendant vertices in trees, Distance and centers in trees, Rooted and Binary trees, Counting trees, Spanning trees, Fundamental circuits, Finding all Spanning trees of a graph, Spanning trees in a weighted graph.

Reference Books *

1. Ralph P. Grimaldi, 2004., **Discrete and Combinatorial Mathematics,** 5th Edition, PHI/Pearson Education
2. Narasingh Deo**, Graph Theory with Applications to Engineering and Computer Science,** PHI.
3. Dr. D.S. Chandrasekharaiah, Graph Theory and Combinatoics. Prism, 2005,
4. Chartrand Zhang, , Introduction to Graph Theory. TMH, 2006
5. Richard A. Brualdi, ,Introductory Combinatorics ,4th Edition, Pearson Prentice Hall, 2004,.
6. Geir Agnarsson & Raymond Geenlaw, Graph Theory Modeling, Applications, and Algorithms.
    a. Pearson Prentice Hall, 2007,

Course Outcomes**

After completion of the course student will be able to

6. Apply concepts of mathematical logic for analyzing propositions and proving theorems.
7. Apply sets for solving applied problems and algebraically use the properties of set operations.
8. Apply the relations and functions and investigate their properties.
9. Introduce basic concepts of graphs, digraphs and trees.
10. Represent the real-world problems in the form of graphs and solve them

* **Books to be listed as per the format with decreasing level of coverage of syllabus**
** **Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1	-	-	-	-	-	-	-	-	-	2	-	1	-
CO2	3	2	1	-	2	1	1	-	-	1	-	2	-	-	1
CO3	3	2	2	1	-	-	-	-	-	-	-	1	-	1	2
CO4	2	2	3	1	-	1	-	-	-	2	-	2	-	1	-
CO5	1	2	3	1	-	1	1	-	-	2	-	2	-	-	1

21UCS602C	Compiler Design	Credits: 04
L:T:P - 4 : 0 : 0		CIE Marks: 50
Total Hours/Week: 04		SEE Marks: 50

UNIT-I	10 Hrs.

Introduction, lexical analysis: Language processors; The structure of a Compiler; Grouping of Phases into Passes, Compiler Construction Tools, Applications of Compiler Technology

Lexical analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens. Lexical Analyzer generator

Syntax analysis – 1: Introduction; Context-free Grammars; Writing a Grammar; Top-down Parsing.

UNIT–II	10 Hrs.

Syntax analysis – 2: Bottom-up Parsing; Introduction to LR Parsing: Simple LR, Using Ambiguous Grammars, Parser Generators.

Syntax-directed translation: Syntax-Directed definitions; Evaluation order for SDDs; Applications of Syntax-directed translation; Syntax-directed translation schemes.

UNIT–III	10 Hrs.

Intermediate Code Generation: Variants of syntax trees; Three-address code; Types and declarations; Translation of expressions; Type checking; Control flow; Backpatching.

UNIT–IV	10 Hrs.

Run-Time Environments: Storage Organization; Stack allocation of space, Access to non-local data on the stack; Heap management (SELF-STUDY);

Code Generation: Issues in the design of Code Generator; The Target language; Addresses in the target code; Basic blocks and Flow graphs; Optimization of basic blocks, sample code generation

Reference Books *

3. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman,"Compilers- Principles, Techniques and Tools", 2nd Edition, Addison-Wesley. 2007
2. Charles N. Fischer, Richard J. leBlanc, Jr,Crafting a Compiler with C Pearson Education1991
3.Andrew W Apple,Modern Compiler Implementation in C Cambridge University Press., 1998
4. Kenneth C Louden , Compiler Construction Principles & Practice, Thomson Education.1997
5. John Levine, Doug Brown, Tony Mason , Lex &Yacc, O'Reilly Media 2nd Edition 1992

Course Outcomes**

After completion of the course student will be able to

1. Demonstrate the understanding of different phases of Compilation
2. Express programming language tokens using regular expressions, and language constructs using Context free grammar.

3. Construct Lexical Analyzer , parser/parsing tables and Syntax directed translation schemes for simple inputs
4. Generate intermediate code for statements in high level language
5. Apply optimization techniques to intermediate code and generate machine code for high level language program

Course Outcomes	**Programme Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	1	1													
CO2	1	3	3										3		3
CO3		3	3									1	3		3
CO4		3	3									1	3		3
CO5		3	3									1	3		3

21UCS603C	Machine Learning	Credits : 3
L:T:P – 3:0:0		CIE Marks : 50
Total Hours/Week : 3		SEE Marks : 50

UNIT-I	10 Hrs.

Introduction to Machine Learning: Introduction**,** What is Machine Learning?, Applications of Machine Learning, Types of Machine Learning, Well posed learning problems, issues in Machine Learning.

Preparing for model: Introduction, Machine Learning Activities

Linear Regression: Introduction, Example of Regression, Common regression algorithm

Concept Learning: Introduction, Concept learning task, Concept Learning as search, Find-s, Candidate elimination algorithm

UNIT–II	10 Hrs.

Decision Tree Learning: Introduction, Decision tree representation, Appropriate problems for decision tree learning, the basic decision tree learning algorithm, Hypothesis space searching in decision tree learning, Issues in decision tree learning

Artificial Neural Networks (ANN) : Introduction, Neural Network Representations, Appropriate Problems For Neural Network Learning, Perceptron, Multilayer Networks And The Back propagation Algorithm, Remarks On The Back propagation Algorithm, An Illustrative Example : Face Recognition..

UNIT–III	10 Hrs.

Bayesian learning : Introduction Bay's theorem, Maximum likelihood and least squared hypothesis, Maximum likelihood hypothesis for predicting probabilities, Minimum Description length principle, Bay's optimal classifier, Gibbs algorithm, Naïve Bay's Classifier. An Example : Classify Text.

Instance Based Learning : Introduction, k-Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis function and case based reasoning

Dimensionality Reduction : Introduction, Subset Selection, Principal Components Analysis, Linear discriminate analysis

UNIT–IV	10 Hrs.

Clustering: Introduction, Mixture Densities, K-means Clustering, Expectation Maximization Algorithm, Mixture Latent Variable models, Supervised learning after clustering, Hierarchical clustering, Choosing the number of clusters

Hypothesis and Performance Evaluation : Basic Performance Criterion, Precision and recall, Other ways to measure Performance**,** Estimating Hypothesis Accuracy, Basics of Sampling Theory, General approach for deriving confidence intervals, difference in error of two hypothesis, comparing learning algorithms

Reference Books *

1.Machine Learning Tom Mitchell McGraw - Hill 2nd Edition, 2013

2.An Introduction to Machine Learning Miroslav Kubat Springer 2ndEdition,2017

3.Introduction to Machine Learning Ethem Alpayd in MIT press, Cambridge, Massachusetts, London 2nd Edition,2010

4. Elements of Statistical Learning Trevor Hastie. Robert Tipeshirani, Jerome Fredman Springer 2ndEdition,2010

5.Building Machine Learning Systems with Python Luis Pedro Coelho and Willi Richart PACKT Publication 2ndEdition,2013

Course Outcomes**

After completion of the course student will be able to

1. Define machine learning and types of learning algorithms
2. Explain various machine learning algorithms.
3. Apply machine learning algorithm to solve problems of moderate complexity.
4. Analyze performance of algorithms by varying some parameters
5. To formulate machine learning model for the simple problem

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		1	1	1									1		1
CO2	1	2	2	2									2		2
CO3	1	3	3	2	3								3		3
CO4	1	3	3	3	3								3		3
CO5	1	3	3	3	3								3		3

SUBJECT CODE 21UCS036E	ADHOC WIRELESS NETWORKS	Credits: 03
L:T:P - N_L : N_T: N_P 3:0:0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

INTRODUCTION, Cellular and Ad Hoc Wireless Networks, Applications of Ad Hoc Wireless Networks,

ISSUES IN AD HOC WIRELESS NETWORKS,

MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS: Issues in designing a mac protocol, design goals of a mac protocol, classifications of mac protocols,

CONTENTION-BASED PROTOCOLS: MACAW: A Media Access Protocol, Floor Acquisition Multiple Access Protocols, Busy Tone Multiple Access Protocols, MACA-By Invitation, Media Access with Reduced Handshake

UNIT–II	10Hrs.

ROUTING PROTOCOLS FOR AD HOC WIRELESS NETWORKS: Issues in designing a routing protocol for ad hoc wireless networks, classifications of routing protocols,

TABLE-DRIVEN ROUTING PROTOCOLS: Destination Sequenced Distance-Vector Routing Protocol, Wireless Routing Protocol, Cluster-Head Gateway Switch Routing Protocol, Source-Tree Adaptive Routing Protocol

ON-DEMAND ROUTING PROTOCOLS: Dynamic Source Routing Protocol, Ad Hoc On-Demand Distance-Vector Routing Protocol, Temporally Ordered Routing Algorithm, Location-Aided Routing

UNIT–III	10 Hrs.

TRANSPORT LAYER PROTOCOLS FOR AD HOC WIRELESS NETWORKS:

Issues in designing a transport layer protocol, design goals of a transport layer protocol, classification of transport layer solutions, tcp over ad hoc wireless networks, Brief Revisit to Traditional TCP and its performance in ADhoc network, Feedback-Based TCP, TCP with Explicit Link Failure Notification, TCP-BuS, Ad Hoc TCP , SplitTCP,

UNIT–IV	10 Hrs.

WIRELESS SENSOR NETWORKS, Applications of Sensor Networks, Comparison with Ad Hoc Wireless Networks, 3 Issues and Challenges, SENSOR NETWORK ARCHITECTURE, Layered Architecture, Clustered Architecture, Data Dissemination, Data Gathering, Mac Protocols For Sensor Networks

Reference Books *

1. C. Siva Ram Murthy and B.S.Manoj - AdHoc Wireless Networks: Architectures and Protocols, 2004, PHI
2. Jagannathan Sarangapani - Wireless Ad-hoc and Sensor Networks: Protocols, Performance and Control, CRC Press.

Course Outcomes**

After completion of the course student will be able to

1. Know the AdHoc wireless network operation and applications.
2. Identify design of MAC protocols for Ad Hoc Wireless Networks.
3. Analyze Routing protocols for Ad Hoc Wireless Networks .
4. Know the need for TCP protocol in Ad Hoc Wireless Networks.
5. Identify issues and challenges in Wireless sensor network.

*** Books to be listed as per the format with decreasing level of coverage of syllabus**

**** Each CO to be written with proper action word and should be assessable and quantifiable**

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	3	2	-	2	2	-	-	-	-	-	-	1	-	-
CO2	-	2	1	-	2	1	-	-	-	-	-	-	-	1	-
CO3	3	2	-	-	1	-	-	-	1	-	-	-	1	1	3
CO4	2	1	1	-	2	1	-	-	1	-	-	1	-	2	1
CO5	1	2	1	-	1	-	-	-	1	-	-	1	1	-	2

SUBJECT CODE : 21UCS631N	Machine Learning Using Python	Credits : 3
L:T:P – 3:0:0		CIE Marks : 50
Total Hours/Week : 3		SEE Marks : 50

UNIT-I	10 Hrs.

Introduction:
What is Machine Learning? Python : Introduction, Data Types, Conditional statements, loops, functions, scikit - learn.
Essential Libraries and Tools : Jupyter Notebook, Numpy, Pandas, Scipy, matplotlib, A First Application : Classifying Iris Species.

UNIT–II	10 Hrs.

Supervised Learning: Classification and Regression, Generalization, Over fitting, and Under fitting, Supervised Machine Learning Algorithms : Some Sample Data sets, k-Nearest Neighbors, Linear Models, Naïve Bayes Classifiers, Decision Trees, Neural Networks (Deep Learning).$_{Ta}$

UNIT–III	10 Hrs.

Unsupervised Learning and Preprocessing : Types of Unsupervised Learning, Challenges in Unsupervised Learning, Preprocessing and Scaling, Dimensionality Reduction, Feature Extraction, and Manifold Learning, Clustering : k-Means Clustering, Agglomerative Clustering

UNIT–IV	10 Hrs.

Model Evaluation and Improvement : Cross-Validation, Evaluation Metrics and Scoring.
Working with Text Data :
Types of Data Represented as Strings, Example Application : Sentiment Analysis of Movie Reviews, Representing Text Data as a Bag of Words : Applying Bag-of-Words to a Toy Data set, Bag-of-Words for Movie Reviews, Stop words.

Reference Books *

1.Introduction to Machine Learning with Python Andreas C. Müller & Sarah Oreilly Publication 1st Edition, 2016
2. Introduction to Python Gourishankar S CSC Press 1st Edition, 2018
3. Core Python Programming Dr.R. Nageshwar Rao Dream Tech Press 2nd Edition, 2018
4. Machine Learning Tom Mitchell McGraw-Hill 2nd Edition,2013
5. Building Machine Learning Systems with Python Luis Pedro Coelho and Willi Richart PACKT Publication 2nd Edition,2013

Course Outcomes**

After completion of the course student will be able to

1. Define machine learning and types of learning algorithms
2. Explain various machine learning algorithms.
3. Apply machine learning algorithm to solve problems of moderate complexity.
4. Analyze performance of algorithms by varying some parameters
5. To formulate machine learning model for the simple problem

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		1	1	1											
CO2	1	2	2	2											
CO3	1	3	3	2	3										
CO4	1	3	3	3	3										
CO5	1	3	3	3	3										

SUBJECT CODE : 21UCS634N	Software Engineering	Credits: 03
L:T:P – 3 : 0: 0		CIE Marks: 50
Total Hours/Week: 40		SEE Marks: 50

UNIT-I	10 Hrs.

OVERVIEW: Introduction: FAQ's about software engineering, Professional and ethical responsibility. **Socio-Technical systems:** Emergent system properties; Systems engineering; Organizations, people and computer systems; Legacy systems.

CRITICAL SYSTEMS, SOFTWARE PROCESSES: Critical Systems: A simple safety-critical system; System dependability; Availability and reliability. **Software Processes**: Models, Process iteration, Process activities.

UNIT–II	10 Hrs.

REQUIREMENTS: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; The software requirements document.

REQUIREMENTS ENGINEERING PROCESSES: Feasibility studies; Requirements elicitation and analysis; Requirements validation; **System Models:** System Models: Context models; Behavioral models; Data models.

UNIT–III	10 Hrs.

SOFTWARE DESIGN: Architectural Design: System organization, Modular decomposition styles; Control styles. **Object-Oriented Design**: An Object-Oriented design process; Design evolution.

DEVELOPMENT: Rapid Software Development: Agile methods; Extreme programming; Rapid application development. **Software Evolution**: Program evolution dynamics; Software maintenance; Evolution processes.

UNIT–IV	10 Hrs.

VERIFICATION AND VALIDATION: Verification and Validation: Planning; Software inspections; Automated static analysis; Verification and formal methods.

Software Testing: System testing; Component testing;Test automation.

Project Management: Project Management: Management activities; Project planning; Project scheduling. **Managing People:** Selecting staff, Motivating People, Managing Groups.

Reference Books *

1. Ian Somerville , 8th Edition, 2007, Software Engineering, Pearson Education.
2. Len Bass, Paul Clements, Rick , 2nd Edition, 2003, Software Architecture in Practice, Pearson Education.
3. Roger S. Pressman, 6th /7th Edition, 2007, Software Engineering: A Practitioners Approach, McGraw-Hill.
4. Shari Lawrence Pfleeger, Joanne, 3rd Edition 2006, Software Engineering Theory and Practice, Pearson Education.
5. Waman S Jawadekar , 1st Edition, 2004, Software Engineering Principles and Practice, Tata McGraw-Hill.

6. Ian Somerville , 10th Edition, 2018, Software Engineering, Pearson Education.

Web links and Video Lectures:

1. http://nptel.ac.in/courses/106/101/106101061/
2. http://nptel.ac.in/courses/106/105/106105087/
3. http://nptel.ac.in/courses/106/105/106105182/
4. http://uml.org
5. VTU EDUSAT PROGRAMME

Course Outcomes**

After completion of the course student will be able to

CO1: Understand the existing theories, models and techniques used for software product development.

CO2: Write software requirement specification based on the formal specifications for software systems.

CO3: Design and develop different components of the software product using standard models.

CO4: Verify and validate the individual components and the whole software product using different testing tools.

CO5: Demonstrate the management of people, project and software quality during the software development process.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		2	1	2				1			3		1	3	2
CO2		3	2	2				1			3		1	3	2
CO3		3	3	2				1			3		1	3	2
CO4		1	2	2				1			3		1	3	2
CO5		2	2	2				1			3		1	3	2

21UCS633N	Human Computer Interface	Credits: 3
L:T:P - 3:0:0		CIEMarks:50
Total Hours/Week40		SEEMarks:50

UNIT-I	10 Hrs.

FOUNDATIONS

The human: Introduction Input output channels Human memory Psychology and the design of interactive systems The computer : Text entry devices Display devices Physical controls, sensors and special devices

UNIT–II	10 Hrs.

INTERACTIONS

Models of interaction, *Design Focus* Frameworks and HCI Ergonomics *Industrial interfaces* Interaction styles Elements of the WIMP interface Interactivity The context of the interaction Paradigms for interaction

UNIT–III	10 Hrs.

HCI IN THE SOFTWARE PROCESS

Design rules Implementation support, Evaluation techniques, Universal design, User support

UNIT–IV	10 Hrs.

COGNITIVE MODELS

Socio-organizational issues and stakeholder requirements Communication and collaboratio0n models Task analysis Dialog notations and design Models of the system Modeling rich interaction

Reference Books *

1. **Human-Computer Interaction** (3rd Edition) Authors: Dix, Finlay, Abowd and Beale. Publisher: Pearson, 2003 ISBN: 0130461091
2. **Introduction to Human Factors Engineering** (2nd Edition) Authors: Wickens, Lee, Liu, and Gordon-Becker Publisher: Pearson, 2004 ISBN-10: 0131837362
3. **Designing the User Interface: Strategies for Effective Human-Computer Interaction** (5th Edition) Authors: Shneiderman, Plaisant, Cohen, and Jacobs Publisher: Addison Wesley; 5th edition (2009) ISBN: 978-0321537

Course Outcomes**

After completion of the course student will be able to

1. Describe and apply user-centered design methods to conduct formative and summative evaluations.
2. Explain and apply core theories and models from the field of HCI.
3. Design and implement useful, usable, and engaging graphical computer interfaces.
4. Discuss and critique research in the field of HCI.
5. Describe special considerations in designing user interfaces for wellness

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	2	-	2	2	-	-	-	-	-	-			
CO2	3	2	3	-	2	1	-	-	-	-	-	-			
CO3	3	2	3	-	3	-	-	-	1	-	-	-			
CO4	2	1	1	-	2	1	-	-	1	-	-	**1**			
CO5	1	1	1	**1**											

21UCS604L	Machine Learning Lab	Credits : 1
L:T:P – 0:0:2		CIE Marks : 50
Total Hours/Week : 2		SEE Marks : 50

12 Hrs.

1. Assignment on Practice of NumPy Library
2. Assignment on Practice of Pandas Library
3. Assignment on Find S algorithm.Let's assume we have a dataset of customers with two attributes: 'age' and 'annual_income'. Divide customers into two groups: "Young Customers" and "High-Income Customers" using the Find-S algorithm.
4. Assignment on candidate elimination algorithm: consider a simplified dataset with two binary attributes ('A' and 'B') and a binary target variable ('Target'). Apply Candidate Elimination algorithm to find the most specific and most general hypotheses that cover all positive and negative examples
5. Assignment on simple regression: Build an application where it can predict a salary based on year of experience using Single Variable Linear Regression (Use Salary dataset from Kaggle). Display the coefficient and intercept. Also visualize the results by plotting the graphs on both training and testing dataset.
6. Assignment on multi-regression: Build an application where it can predict price of a house using multiple variable Linear Regression (Use USA_Housing dataset from Kaggle). Display all the coefficients.
7. Assignment on binary classification using Decision Tree Classifier: Build an application to decide on whether to play the tennis using Decision Tree. Use Tennis data from Kaggle. Do the required data processing. Display Accuracy score, Classification report and Confusion matrix.
8. Assignment on binary classification using Perceptron: Implement Perceptron model. Use this model to classify a patient that she is having cancer or not. Use Breast cancer dataset from sklearn library. Display Accuracy score, Classification report and Confusion matrix.
9. Assignment on Multi classification using Multilayer Perceptron (MLP): Buid an application to classify a given flower into its specie using MLP. Use Iris dataset from Kaggle. Display Accuracy score, Classification report and Confusion matrix.
10. Assignment on regression using KNN: Build an application where it can predict a salary based on year of experience using KNN (Use Salary dataset from Kaggle).
11. Assignment on Classification using KNN: Buid an application to classify a given flower into its specie using KNN (Use Iris dataset from sklearn library)
12. Assignment on Naïve Bayes classifier: Using Naïve Bayes classifier, build an application to classify

a given text. Use text data from sklearn (Text classification)

13. Assignment on Image Processing: Build an application to recognise a Digit from an image using MLP (Use Digit image Dataset from sklearn)

14. Assignment on Dimensionality Reduction using PCA.

15. Assignment on clustering: Generate random data points and apply following algorithms to form clusters based on the distance between the data points. Compare results.

i. Hierarchical clustering

ii. K-mean Clustering:

Reference Books *

1.Machine Learning Tom Mitchell McGraw - Hill 2nd Edition, 2013

2.An Introduction to Machine Learning Miroslav Kubat Springer 2ndEdition,2017

3.Introduction to Machine Learning Ethem Alpayd in MIT press, Cambridge, Massachusetts, London 2ndEdition, 2010

4. Elements of Statistical Learning Trevor Hastie. Robert Tipeshirani, Jerome Fredman Springer 2ndEdition, 2010

5.Building Machine Learning Systems with Python Luis Pedro Coelho and Willi Richart PACKT Publication 2ndEdition, 2013

Course Outcomes**

After completion of the course student will be able to

1. To formulate machine learning model for the simple problem
2. Apply machine learning algorithm to solve problems of moderate complexity.
3. Analyze performance of algorithms by varying some parameters

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		1	1	1									1		1
CO2	1	2	2	2									2		2
CO3	1	3	3	2	3								3		3

21UCS605P	Mini Project	Credits: 2
L:T:P –0:0:4		CIEMarks:50
Total Hours/Week: 6		SEEMarks:50

Assignment list

Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or multidisciplinary Mini- project can be assigned to an individual student or to a group having not more than 4 students. The mentor shall monitor progress of the student/s continuously. The student/s is/are required to present the progress of the Mini Project work during the semester as per the schedule provided by the Department Project Coordinator.

Reference Books *

Course Outcomes**

After completion of the course student will be able to

1. Develop the ability to solve real life problems related to software development.
2. Identify the issues and challenges in the domain.
3. Apply the knowledge and techniques learnt in theoretical classes.
4. Explain the deeper understanding in specific functional are, as of the real problems.
5. Explore career opportunities in their areas of interest.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2	1	2	-	-	3	3	2	3	2	2	
CO2	-	3	2	2	-	-	-	-	3	3	1	3	-	2	
CO3	-	3	3	2	-	2	-	-	2	2	2	2	3	1	
CO4	3	3	3	2	3	-	-	-	2	2	3	2	3	3	
CO5	-	3	3	2	2	-	-	-	1	2	2	3	2	1	

VII Semester B.E. (CSE)

Sl. No	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION MARKS		
					L	T	P	Cie	See	total
1.	HSMC	21UCS701C	Management and Entrepreneurship	3	3	0	0	50	50	100
2.	PCC	21UCS702C	Software Engineering	3	3	0	0	50	50	100
3.	PEC	21UCSXXXE 21UCS081E	Professional Elective Course-III Prompt Engineering	3	3	0	0	50	50	100
4.	PEC	21UCSXXXE	Professional Elective Course –IV	3	3	0	0	50	50	100
		21UCS003E	Cryptography and Network Security							
		21UCS070E	Block chain Technology							
5	Project	21UCS703P	Project Work	7	0	0	14	50	50	100
Total				19	12	0	14	250	250	500

BSC	ESC	HSMC	AEC	PCC	PEC	OEC	PROJ	INT	SEMI	MAN(UHV)
--	--	03	---	03	06	--	08	--	--	--

22UCS701C	Management and Entrepreneurship	Credits: 03
L:T:P - 3 : 0: 0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Nature and Functions of Management: Importance, Definition, Functions and Levels of Management, Roles of a manager, Managerial Skills, Management & Administration, Management - a science or an art or a profession.

Development of Management Thought: Early Management Approaches- Scientific, Administrative, and Bureaucracy. Modern Approaches - Quantitative, Systems and Contingency Approaches.

UNIT–II	10 Hrs.

Planning: Nature, Importance, Forms, Steps in planning, Limitations of planning, Making planning effective.

DecisionMaking: Meaning,Types,StepsinRationalDecisionMaking,EnvironmentsofDecisionmaking,CommonDifficultiesin Decision making.

Organization: Meaning,ProcessofOrganizing,SpanofManagement,PrinciplesofOrganizing,OrganizationStructure,Committees,Teams.

UNIT–III	10 Hrs.

Coordination: Distinction between coordination and cooperation, Need for coordination, Requisites for excellent coordination, Types, Techniques, Difficulty of coordination.

Staffing: ImportanceandNeedforProperStaffing,ManpowerPlanning,Recruitment,Selection,Placement.

DirectionandSupervision: Requirementsofeffectivedirection,Givingorders,Motivation: Meaning and Natureof Motivation.

UNIT–IV	10 Hrs.

Entrepreneurship: Introduction, Entrepreneur, Functions of an Entrepreneur, Types ofEntrepreneurs,Intrapreneur, Entrepreneurship, RoleofEntrepreneursinEconomicDevelopment,EntrepreneurshipinIndia,Barriers of Entrepreneurship.

Preparation Of Project: Meaning of Project, Project Identification, Project Selection, Project Report: Need, Significance and Contents, Project Formulation, Project Appraisal, Identification of Business Opportunities,Feasibility Studies:Technical,Financial,MarketandSocial.

Reference Books

1. P. C. Tripathi, P.N. Reddy, 2012, "Principles of Management" (5th Edition), Tata McGraw Hill.
2. N. V. R Naidu & T. Krisna Rao, 2019, "Management & Entrepreneurship" (1st Edition), Wiley.
3. Robert Lusier, 2012, "Management Fundamentals - Concepts, Application" (5th Edition) , Skill Development", *Thomson*/South-Western.
4. S. S. Khanka, 1999, "Entrepreneurship Development" (1st Revised Edition), S. Chand & Co. New Delhi.

5. Stephen Robbins, 2003, "Management" (17th Edition), Pearson Education/PHI.
6. Vasant Desai, 2001, "Dynamics of Entrepreneurial Development & Management" (4th Edition), Himalaya Publishing House.

Course Outcomes

After completion of the course student will be able to

1. Identify the different levels of management along with the different types of managers, their roles and functions.
2. Develop the ability to plan and organize the activities required to complete the project.
3. Recognize, understand and explain the role of staffing in management.
4. Explain the fundamentals of entrepreneurship and its development process.
5. Develop the ability to solve a specific problem right from its identification to successful completion of the project.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	3	2	-	-	-	2	2	3	-	-
CO2	-	2	-	-	-	-	2	-	3	3	3	3	2	-	-
CO3	-	-	-	-	-	_	-	-	3	3	2	2	2	-	-
CO4	-	-	2	-	-	3	-	-	-	3	2	2	1	-	-
CO5	-	2	2	2	-	-	-	-	2	2	3	3	1	-	-

22UCS702C	Software Engineering	Credits: 03
L:T:P - 3 : 0: 0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Overview: Introduction: FAQ's about software engineering, Professional and ethical responsibility. **Socio-Technical systems:** Emergent system properties; Systems engineering; Organizations, people and computer systems; Legacy systems. **Critical Systems:** A simple safety-critical system; System dependability. **Software Processes**: Models, Process iteration, Process activities.

UNIT–II	10 Hrs.

Requirements: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; The software requirements document. **Requirements Engineering Processes:** Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management. **System Models:** System Models: Context models; Behavioral models; Data models; Object models, structured methods.

UNIT–III	10 Hrs.

Software Design: Architectural Design, System organization; Modular decomposition styles; Control styles. **Development:** Rapid Software Development: Agile methods; Extreme programming; Rapid application development. **Software Evolution**: Program evolution dynamics; Software maintenance; Evolution processes, Legacy system evolution.

UNIT–IV	10 Hrs.

Verification And Validation: Verification and Validation: Planning; Software inspections; Automated static analysis; Verification and formal methods. **Software Testing:** System testing; Component testing; Test case design; Test automation. **Project Management:** Management activities; Project planning; Project scheduling, Risk management. **Managing People :** Managing groups; The People Capability Maturity Model.

Reference Books

1.Software Engineering Ian Somerville Pearson Education 8thEdition,2007
2.Software Architecture in Practice Len Bass, Paul Clements, Rick Kazman Pearson Education 2ndEdition,2003
3.Software Engineering: A Practitioners Approach Roger S. Pressman McGraw-Hill 6th/7thEdition,2007
4.Software Engineering Theory and Practice Shari Lawrence Pfleeger, Joanne M. Atlee Pearson Education 3rdEdition,2006
5.Software Engineering Principles and Practice, Waman S Jawadekar, Tata McGraw-Hill 1stEdition,2004
6.Software Engineering, Ian Somerville Pearson Education 10thEdition,2018

Course Outcomes

After completion of the course student will be able to

1. Understand the existing theories, models and techniques used for software productdevelopment.
2. Write software requirement specification based on the formal specifications for software systems.
3. Design and develop different components of the software product using standard models.
4. Verify and validate the individual components and the whole software product using different testing tools.
5. Demonstrate the management of people and project during the software development

process.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	1	1				2				**1**			**1**	**1**	
CO2	2	1	2							**1**			**1**	**2**	
CO3	1	1											**1**	**1**	
CO4	1	1										**2**	**1**	**1**	
CO5	1	1				2				**1**			**1**	**1**	

21UCS081E	Prompt Engineering	Credits: 03
L:T:P - 3 : 0: 0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Introduction to Prompt Engineering and AI Models

- **Overview of Natural Language Processing (NLP)**
  - Introduction to NLP techniques
  - Role of AI models in understanding and generating language
- **Understanding AI Models**
  - Types of AI models: Rule-based vs. ML models
  - Overview of transformers, large language models (LLMs), and GPT architectures
- **Prompt Engineering Basics**
  - Definition of prompt engineering
  - Introduction to inputs, outputs, and responses

Role of prompt design in AI model performance

UNIT–II	10 Hrs.

Prompt Design and Optimization

- **Fundamentals of Effective Prompt Creation**
  - Types of prompts: Declarative, imperative, and descriptive prompts
  - Open-ended vs. closed-ended prompts
  - Techniques for crafting clear, concise, and contextual prompts
- **Optimizing Prompts for Specific Tasks**
  - Using prompts in summarization, question answering, and translation
  - Fine-tuning prompts for accuracy and relevance
- **Human-in-the-loop Optimization**
  - Iterative prompt tuning

Using feedback and error correction in prompt design

UNIT–III	10 Hrs.

Advanced Techniques in Prompt Engineering

- **Prompt Chaining and Contextual Prompts**
  - Multi-turn conversations: Maintaining context across prompts
  - Chaining prompts to solve complex tasks
- **Multi-modal Prompts**
  - Combining text with images, video, and other media
  - Practical use cases in media generation and analysis
- **Zero-shot, Few-shot, and Transfer Learning in Prompting**
  - Understanding zero-shot and few-shot learning through prompt construction

- Transfer learning and leveraging pre-trained models

Hands-on: Implementing multi-modal prompts using popular AI platforms

UNIT–IV | 10 Hrs.

Ethical Considerations and Bias in Prompt Engineering

- **Ethical Challenges in AI and Prompt Engineering**
  - Understanding biases in AI-generated content
  - Managing ethical dilemmas in AI responses and use cases
- **Avoiding Harmful Outputs**
  - Identifying and preventing biased, offensive, or harmful outputs
  - Techniques for neutralizing bias in prompt construction
- **Fairness, Accountability, and Transparency (FAT) in AI**
  - Designing prompts for inclusivity and fairness
  - Tools and methods for auditing AI outputs

Reference Books

1. MASTERING PROMPT ENGINEERING Techniques for Creating Powerful and Effective AI Language Models August 2022 Abu Rayhan Abu Rayhan.
2. Mastering Generative AI and Prompt Engineering: A Practical Guide for Data Scientists

Course Outcomes

After completion of the course student will be able to

1. Explain the fundamentals of NLP, transformers, and large language models.
2. Create effective and optimized prompts for various AI-driven tasks.
3. Design and implement advanced prompt engineering techniques like prompt chaining and multi-modal prompting.
4. Critically assess and address ethical challenges related to AI-generated content.
5. Apply prompt engineering principles to build and deploy AI solutions in real-world applications.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	3	-	-	-	-	-	-	2			
CO2	3	3	3	2	3	-	-	-	-	2	-	-			
CO3	3	3	3	3	3	-	-	-	-	1	-	-			
CO4	2	3	2	3	2	3	3	3	-	1	-	2			
CO5	3	3	3	3	3	2	-	-	-	2	-	3			

21UCS003E	Cryptography And Network Security	Credits: 03
L:T:P - 3 : 0: 0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Symmetric Ciphers: Overview: Services, Mechanisms and Attacks, The OSI Security Architecture, A Model of Network Security. Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography. Block Cipher and the Data Encryption Standard: Simplified DES, Block Cipher Principles.

UNIT–II	10 Hrs.

The Data Encryption Standard: The Strength of DES, Differential and Linear Cryptanalysis. Symmetric Ciphers: Triple DES, Blowfish. Confidentiality Using Conventional Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation. Public-Key Encryption.

Digital signatures and Authentication Protocols: Number Theory: Prime Numbers, Format's and Euler's Theorems, Testing for Primality. Public-Key Cryptography and RSA: Principles ofPublic Key Cryptosystems, The RSA Algorithm, Key Management, Diffie Hellman Key Exchange.

UNIT–III	10 Hrs.

Message Authentication: Authentication Requirements, Authentication Functions, Message Authentication Codes, MD5 Message Digest Algorithm. Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standard.

Network Security: Authentication Applications: Kerberos, X.509 Directory Authentication Service. Electronic Mail Security: Pretty Good Privacy.

UNIT–IV	10 Hrs.

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload.

Web Security: Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

Reference Books

1. William Stallings , Cryptography and Network Security PHI Publications 3 rd /4 th Edition, 2017
2. Michael E. Whitman,Herbert J. Mattord, ,Principles ofInformation Security, ThomsonPublications4 nd Edition, 2014
3. William Stallings, PearsonEducation, Network Security EssentialsApplications andStandards,4 th Edition, 2011
2. Behrouz A. Forouzan Tata McGraw-Hill, Cryptography andNetwork Security , 3 rd Edition, 2015

Web links and Video Lectures:

1. https://www.youtube.com/watch?v=rA_ZmWPormM
2. https://nptel.ac.in/courses/106/105/106105162/
3. https://nptel.ac.in/courses/106/105/106105031/

Course Outcomes

After completion of the course student will be able to

1. Identity and analyze the existing security vulnerabilities, services and mechanisms in acomputer network and develop a security model to prevent, detect and recover from the attacks.
2. Illustrate the basic concept of encryption and decryption for secure data transmission and apply them.
3. Analyze and compare various cryptography techniques, authentication and key management protocols.

3. Explain the services and mechanisms employed at the different layers of the OSI to provide security.
4. Evaluate the existing computing systems and propose new strategies to secure data communication.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	3	2	-	-	-	2	2	3	-	-
CO2	-	2	-	-	-	-	2	-	3	3	3	3	2	-	-
CO3	-	-	-	-	-	_	-	-	3	3	2	2	2	-	-
CO4	-	-	2	-	-	3	-	-	-	3	2	2	1	-	-
CO5	-	2	2	2	-	-	-	-	2	2	3	3	1	-	-

SUBJECT CODE: UCS070E	Blockchain Technology	Credits:03
L:T:P - N_L : N_T: N_P : **(3:0:0)**		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

UNIT-I	10 Hrs.

Blockchain 101: Distributed systems, History of blockchain, Introduction to blockchain:various technical def of block chain, Generic Elements, Features, Applications,,

Types of blockchain: Public, Private, Semi-private, Side chain, Permissioned ledger, Distributed ledger, Shared, Fully private and proprietary block chains, Tokenized and tokenless block chains, Consensus block chains, CAP theorem and blockchain, Benefits and limitations of

blockchain.

UNIT–II	10 Hrs.

Decentralization and Cryptography:

Decentralization using blockchain, Methods of decentralization, Routes to

decentralization, Blockchain and full ecosystem decentralization, Smart contract, Decentralized organizations.

Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric

cryptography,

UNIT–III	10 Hrs.

Bitcoin and Alternative Coins

A: Bitcoin, Transactions life cycle, structure, types of transaction , Blockchain: structure of block and header, Genesis block,bitcoin network, Wallets, Bitcoin payments: investment and buying and selling bitcoins, Bitcoin installation, Bitcoin programming and command line interface, BIPS

B: Alternative Coins

Theoretical foundations: proof of work, Difficulty adjustment and retargeting algorithms, Bitcoin limitations,

UNIT–IV	10 Hrs.

Smart Contracts and Ethereum 101:

Smart Contracts: Definition, Ricardian contracts: Smart contract templates, oracles, Smart oracles, Deploying smart contracts on a block chain.

Ethereum 101: Introduction, Ethereum blockchain, Elements of the Ethereum block chain,

Precompiled contracts.

Reference Books *

5. Imran Bashir "Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained" 2nd Edition, Packt Publishing Ltd,
6. Arvind Narayanan, Joseph Bonneau, , Edward Felten, "Bitcoin and Cryptocurrency Technologies" 2016
7. Arshdeep Bahga, Vijay Madisetti "Blockchain Applications" a Hands on Approach

Course Outcomes**

After completion of the course student will be able to

1. Become familiar with basic principles of Blockchain technology
2. Investigate technologies of the distributed computing and cryptography related to blockchain.
3. Develop abilities to apply, build and modify Bitcoin.
4. Apply security features in Blockchain technologies.
5. Analyze the Design of Ethereum blockchain .

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	2	-	2	2	-	-	-	-	-	-	-	-	1
CO2	3	2	3	-	2	1	-	-	-	-	-	-	2	-	1
CO3	1	2	1	-	3	-	-	-	1	-	-	-	-	1	2
CO4	2	1	1	-	2	1	-	-	1	-	-	1	-	1	-
CO5	1	2	3		1	2	-	-	--	-	-	1	1	-	1

21UCS703P	Project Work	Credits :7
Hours/Week : **(0 : 0 : 14)**		CIE Marks : 50
Total Hours :56		SEE Marks : 50

Students have to take up literature survey, formulate the problem of the project, define the project objectives and prepare the project implementation schedule. Project work, based on the problem defined, should be completed and implemented. The implementation of the project work can be done either in a reputed industry/ research organization/ parent institute. A certified report with project demonstration and a seminar is to be presented by the students. The seminar should highlight – Broad project area of their project work carried out.

CIE of 50 marks will be conducted by the Committee consisting of HOD/Nominee + Project Coordinator + Guides as per the rubrics. For SEE, student has to make a presentation of the work carried out to Project Evaluation Committee (PEC- Project coordinator, Hod/Nominee, External Examiner). PEC will allot SEE marks for 50.

Course Outcomes

At the end of this course, students will be able to:

1. Identify, formulate & analyze the engineering problems associated with Computer Science & engineering and interdisciplinary research.
2. Design & implement proposed solutions for complex engineering problems to meet specified objectives by analyzing / validating the design / solutions of engineering problems using contemporary tools & resources.
3. Prepare engineering documents and make effective presentation to communicate effectively and collaboratively with detailed analysis and interpretation of results to yield valid conclusions.
4. Demonstrate social, ethical cultural & engineering professional responsibilities.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3						3	3	3	1	3	3	3	3
CO2	3	3		2		2		3	3	3	2	2	3	3	3
CO3	3	3	3	3	3	3	1	3	3	3	3	3	3	3	
CO4	1	1	2					3	3	3	1	2	3	3	

VIII Semester B.E. (CSE)

Sl. No	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION MARKS		
					L	T	P	CIE	SEE	Total
1.	**AEC**	**21UCS800O**	**MOOCs**	**3**	**-**	**-**	**-**	25	**75**	**100**
2.	**Seminar**	**21UCS801S**	**Technical Seminar**	**1**	-	-	-	**100**	0	**100**
3.	**INT**	**21UCS802I**	**Research/Industrial Internship**	**10**	**0**	**0**	**20**	**100**	0	**100**
4.	**AEC**	**21UCS803C**	**Research Methodology & Intellectual Property Rights**	**2**	0	2	2	**50**	**50**	**100**
Total				**16**	0	2	**22**	**275**	**125**	**400**

*** 7th and 8th semesters are swapped between group 1 and group 2 students**

UCS801S	Technical Seminar	Credits: 01
L:T:P - 0 : 2 : 0		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

Seminars are used as course delivery modes to encourage students to gather current trends in technology, research literature, and self-learn topics of their interest. Seminars require students to research a technical topic, make presentations and write a detailed document on their findings individually under the guidance of faculty.

Course Outcomes**

After completion of the course student will be able to

1. Identify seminar topics based on contemporary technical, societal, and environmental issues.
2. Conduct literature survey on complex issues in the selected domain
3. Explore advanced technologies
4. Make good oral and written technical presentations

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		2		3	3	2		2					1	1	1
CO2											2	2	1	1	
CO3		2		3									1	1	
CO4									2		3	3	1	1	1

22UCS802I	Internship	Credits: 10
L:T:P - 0 : 0 : 20		CIE Marks: 100
Total Hours/Week: 20		SEE Marks: 100

Internship:

Students need to meet following criteria to successfully complete the internship course.

1. **Student's Diary/ Daily Log**

   Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. It will be evaluated based on the following criteria:

   - Regularity in maintenance of the diary.
   - Adequacy & quality of information recorded.
   - Drawings, sketches, and data recorded.
   - Thought process and recording techniques used.
   - Organization of the information.

2. **Internship Report**

   The Internship report will be evaluated based on following criteria:

   - Originality.
   - Internship certificate from the industry.
   - Adequacy and purposeful write-up.
   - Organization, format, drawings, sketches, style, language etc.
   - Variety and relevance of learning experience.
   - Practical applications, relationships with basic theory and concepts taught in the course.

Evaluation:

The industrial training of the students will be evaluated in three stages:

1. Evaluation by Industry.
2. Evaluation through seminar presentation
3. Viva-voce at the Institute.

Evaluation Through Seminar Presentation/Viva-Voce at The Institute

The student will give a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria:

- Quality of content presented.
- Proper planning for presentation.
- Effectiveness of presentation.
- Depth of knowledge and skills.
- Attendance record, daily diary, departmental reports shall also be analyzed along with the Internship Report.

Summary of Internship Evaluation(Industry Representative)	
Evaluation Criteria	**Score from the above tables**
Quality of Work	10
Ability to Learn	10
Initiative and Creativity	10
Character Traits	10
Dependability	10
Organizational Fit	10
Response to Supervision	10
	70
Internship Guide	
Demonstration of experience	10
Report	10
Presentation	10
	30

Total CIE 100 = 70 (Industry Evaluation) + 30 (CIE). No SEE conducted for Internship.

Course Outcomes

After completion of the course student will be able to

1. Demonstrate the knowledge gained during the internship at the industry.
2. Exhibit abilities to use theoretical concepts in solving practical problems in their field of study.
3. Demonstrate communication, interpersonal and other critical skills in their profession.

Course Outcomes	Programme Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1		2	2	2	2	2				2			2	1	1
CO2		2	2	2	2	2				2			2	1	1
CO3		1	1	1	1	1				3			1		1

Course Code: UHS753C / UHS731N	**Research Methodology & Intellectual Property Rights**	Credits	3
Hours/Week (L:T:P: S): 2:2:0:0		CIE Marks	50
Total Hours of Pedagogy (Theory) 25		SEE Marks	50

Course Objectives:

CO1. To Understand the knowledge on basics of research and its types.
CO2. To Learn the concept of Literature Review, Technical Reading, Attributions and Citations.
CO3. To learn Ethics in Engineering Research.
CO4. To Discuss the concepts of Intellectual Property Rights in engineering.

Teaching-Learning Process (General Instructions)

These are sample Strategies; that teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer methods (L) need not be only the traditional lecture methods, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video to explain various concepts on IPR.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher Order Thinking) questions in the class, which promotes critical thinking.
5. Introduce Topics in manifold representations.
6. Show the different ways to analyze the research problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps Improve the students' understanding.
8.

Module-1	**(5 Hours)**

Introduction: Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem.

Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship.

Teaching- Learning Process	Chalk and talk method / PowerPoint Presentation.

Module-2	**(5 Hours)**

Literature Review and Technical Reading, New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet.

Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments.

Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation

Module-3	**(5 Hours)**

Introduction To Intellectual Property: Role of IP in the Economic and Cultural Development of the Society, IP Governance, IP as a Global Indicator of Innovation, Origin of IP History of IP in India. Major Amendments in IP Laws and Acts in India.

Patents: Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention. Rights Associated with Patents. Enforcement of Patent Rights. Inventions Eligible for Patenting. Non-Patentable Matters. Patent Infringements. Avoid Public Disclosure of an Invention before Patenting. Process of Patenting.

Process of Patenting. Prior Art Search. Choice of Application to be Filed. Patent Application Forms. Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection. Post-grant Opposition. Commercialization of a Patent. Need for a Patent Attorney/Agent. Can a Worldwide Patent be Obtained? Do I Need First to File a Patent in India? Patent Related Forms. Fee Structure. Types of Patent Applications. Commonly Used Terms in Patenting. National Bodies Dealing with Patent Affairs. Utility Models.

Teaching- Learning Process	Chalk and talk method / PowerPoint Presentation.

Module-4	(5 Hours)
Copyrights and Related Rights: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement is a Criminal Offence. Copyright Infringement is a Cognizable Offence. Fair Use Doctrine. Copyrights and Internet. Non-Copyright Work. Copyright Registration. Judicial Powers of the Registrar of Copyrights. Fee Structure. Copyright Symbol.	
Validity of Copyright. Copyright Profile of India. Copyright and the word 'Publish'. Transfer of Copyrights to a Publisher. Copyrights and the Word 'Adaptation'. Copyrights and the Word 'Indian Work'. Joint Authorship. Copyright Society. Copyright Board. Copyright Enforcement Advisory Council (CEAC). International Copyright Agreements, Conventions and Treaties. Interesting Copyrights Cases. **Trademarks**: Eligibility Criteria. Who Can Apply for a Trademark. Acts and Laws. Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India. Trademark Registry. Process for Trademarks Registration. Prior Art Search. Famous Case Law: Coca-Cola Company vs. Bisleri International Pvt. Ltd.	
Module-5	**(5Hours)**
Industrial Designs: Eligibility Criteria. Acts and Laws to Govern Industrial Designs. Design Rights. Enforcement of Design Rights. Non-Protectable Industrial Designs India. Protection Term. Procedure for Registration of Industrial Designs. Prior Art Search. Application for Registration. Duration of the Registration of a Design. Importance of Design Registration. Cancellation of the Registered Design. Application Forms. Classification of Industrial Designs. Designs Registration Trend in India. International Treaties. Famous Case Law: Apple Inc. vs. Samsung Electronics Co. **Geographical Indications**: Acts, Laws and Rules Pertaining to GI. Ownership of GI. Rights Granted to the Holders. Registered GI in India. Identification of Registered GI. Classes of GI. Non-Registerable GI. Protection of GI. Collective or Certification Marks. Enforcement of GI Rights. Procedure for GI Registration Documents Required for GI Registration. GI Ecosystem in India. **Case Studies on Patents.** Case study of Curcuma (Turmeric) Patent, Case study of Neem Patent, Case study of Basmati patent. **IP Organizations In India. Schemes and Programmes**	
Teaching- Learning Process	Chalk and talk method / PowerPoint Presentation

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will **be scaled down to 50 marks** (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the Outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by the University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will be set for 100 marks. Marks scored shall be proportionally reduced to 50 marks.
2. The question paper will have ten questions. Each question is set for 20 marks.
3. There will be 2 questions from each module. Each of the two questions is under a module (with a maximum of 2 sub-questions).
4. The students have to answer 5 full questions, selecting one full question from each module.

Course Outcomes (Course Skill Set)

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

CO 1. To know the meaning of engineering research.

CO2. To know the procedure of the literature Review and Technical Reading

.CO3. To understand the fundamentals of the patent laws and drafting procedure.

CO 4. Understanding the copyright laws and subject matters of copyrights and designs.

CO5. Understanding the basic principles of design rights.

Suggested Learning Resources:

Textbook

1. Dr. Santosh M Nejakar, Dr. Harish Bendigeri "Research Methodology and Intellectual Property Rights", ISBN 978-93-5987-928-4, Edition: 2023-24.

Reference Book:

1. David V. Thiel "Research Methods for Engineers" Cambridge University Press, 978-1-107-03488-4 –
2. Intellectual Property Rights by N.K.Acharya Asia Law House 6th Edition. ISBN: 978-93-81849-30-9

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars