B.V.V Sangha's
BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT
DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

Scheme of Teaching and Evaluation (NEP 1st Batch-160 Credits)

I Semester
(Applicable students admitted during AY 2021-22 to 1st semester)

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	21UMA101C	Engineering Mathematics-I	3	3	0	0	50	50	100
2	21UPH102C	Engineering Physics	3	3	0	0	50	50	100
3	21UCS103C	Principles of Programming with C	3	3	0	0	50	50	100
4	21UEC104C	Basic Electronics	3	2	2	0	50	50	100
5	21UEE105C	Basic Electrical Engineering	3	3	0	0	50	50	100
6	21UHS106C	Communicative English	2	2	0	0	50	50	100
7	21UHS107C	Scientific Foundations of Health	1	1	0	0	50	50	100
8	21UPH108L	Engineering Physics Laboratory	1	0	0	3	50	50	100
9	21UCS109L	Programming Practice Using C	1	0	0	2	50	50	100
		Total	**20**	**17**	**2**	**5**	**450**	**450**	**900**

II Semester
(Applicable students admitted during AY 2021-22 to 2nd semester)

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	21UMA201C	Engineering Mathematics-II	3	3	0	0	50	50	100
2	21UCH210C	Engineering Chemistry	3	3	0	0	50	50	100
3	21UCV211C	Engineering Mechanics	3	3	0	0	50	50	100
4	21UME212C	Elements of Mechanical Engineering	3	2	2	0	50	50	100
5	21UME213L	Computer Aided Engineering Drawing	3	2	0	2	50	50	100
6	21UHS206C	Professional Writing Skills in English	2	2	0	0	50	50	100
7	21UHS215C	Innovation and Design Thinking	2	1	0	2	50	50	100
8	21UCH214L	Engineering Chemistry Laboratory	1	0	0	2	50	50	100
		Total	**20**	**16**	**2**	**6**	**400**	**400**	**800**

Scheme of Teaching and Evaluation

III Semester

(Applicable students admitted during AY 2021-22 to 1st semester and Lateral Entry AY 2022-23 to 3rd Semester)

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	21UMA301C	Numerical Techniques & Integral Transforms	3	3	0	0	50	50	100
2	21UIS304C	Logic Design	3	3	0	0	50	50	100
3	21UIS302C	Computer Organization	3	3	0	0	50	50	100
4	21UIS303C	Data Structures	4	3	2	0	50	50	100
5	21UIS380L	Logic Design Laboratory	1.5	0	0	3	50	50	100
6	21UIS381L	Data Structures Laboratory	1.5	0	0	3	50	50	100
7	21UIS382L	Advanced C Laboratory	1	0	0	2	50	50	100
8	21UMA300M	Bridge Course Mathematics-I *	--	2	2	--	50	50	100
9	21UHS321C	Constitution of India	1	1	0	0	50	50	100
10	21UHS324C	Universal Human Values-II	1	1	0	0			
		Total	**19**	**16**	**4**	**8**	**500**	**500**	**1000**

IV Semester

(Applicable students admitted during AY 2021-22 to 1st semester and Lateral Entry AY 2022-23 to 4th Semester)

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	21UMA401C	Statistics and Probability Distributions	3	3	0	0	50	50	100
2	21UIS413C	Analysis and Design of Algorithms	3	3	0	0	50	50	100
3	21UIS424C	Object Oriented Programming with Java	4	3	2	0	50	50	100
4	21UIS409C	Microcontroller and Embedded Systems	3	3	0	0	50	50	100
5	21UIS415C	Operating Systems	3	3	0	0	50	50	100
6	21UIS431L	Analysis of Algorithms using JAVA Laboratory	1	0	0	2	50	50	100
7	21UIS420L	Microcontroller and Embedded Systems Laboratory	1	0	0	2	50	50	100
8	21UIS412L	System Administration Laboratory	1	0	--	2	50	50	100
9	21UIS413I	Internship-I (3 weeks)	2	--	--	--	50	50	100
10	21UHS422C/ 21UHS423C	Samskruthika Kannada# / Balake Kannada$	1	1	--	--	50	50	100
11	21UMA430M	Bridge Course Mathematics-II*	--	2	2	0	50	50	100
		Total	**22**	**18**	**4**	**6**	**550**	**550**	**1100**

Note: Internship-I student can undergo this internship during vacation between 1st and 2nd year

Scheme of Teaching and Evaluation

V Semester

(Applicable students admitted during AY 2021-22 to 1st semester and Lateral Entry AY 2022-23 to 3rd semester, 2023-24 5th Semesters)

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	21UIS519C	Discrete Mathematical Structures	3	3	0	0	50	50	100
2	21UIS513C	Web Programming(Integrated)	3	3	0	0	50	50	100
3	21UIS503C	Database Management System	3	3	0	0	50	50	100
4	21UIS047E	Data Science using Python **(Professional Elective Course- I)**	3	3	0	0	50	50	100
5	21UIS532N	Java Programming **(Professional Open Elective Course- I)**	3	3	0	0	50	50	100
6	21UIS511L	Database Application Laboratory	1	0	0	2	50	50	100
7	21UIS517I	Internship-II (4 weeks)	3	0	0	4	50	50	100
8	21UBT521C	Environmental Studies	1	0	1	0	50	50	100
9	21UHS521C	Qualitative Aptitude and Professional Soft Skills	2	2	0	0	50	50	100
		Total	**22**	**20**	**1**	**6**	**450**	**450**	**900**

Note: Internship-I student can undergo this internship during vacation between 2nd and 3rd year

VI Semester

(Applicable students admitted during AY 2021-22 to 1st semester and Lateral Entry AY 2022-23 to 3rd semester, 2023-24 6th Semesters)

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	21UIS615C	Theoretical Foundation of Computer Science	3	3	0	0	50	50	100
2	21UIS616C	Software Engineering	3	3	0	0	50	50	100
3	21UIS617C	Computer Network	3	3	0	0	50	50	100
4	21UIS045E/ 21UIS038E	Internet of Things/Big Data Analytics **(Professional Elective Course- II)**	3	3	0	0	50	50	100
5	21UISXXXN	Data Science using Python **(Professional Open Elective Course- II)**	3	3	0	0	50	50	100
6	21UISXXXN	Data Mining **(Professional Open Elective Course- III)**	3	3	0	0	50	50	100
7	21UIS620L	Computer Network Laboratory	1	0	1	3	50	50	100
8	21UIS614P	Mini Project	2	0	0	4	50	50	100
		Total	**21**	**18**	**1**	**7**	**400**	**400**	**800**

		Professional Elective Course- II(Offered)
01	21UIS045E	Internet of Things
02	21UIS038E	Big Data Analytics

Scheme of Teaching and Evaluation

VII Semester

(Applicable students admitted during AY 2021-22 to 1st semester and Lateral Entry AY 2022-23 to 3rd semester, 2024-25 7th Semesters)

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	21UIS720C	Object Oriented Modeling and Design	3	3	0	2	50	50	100
2	21UIS718C	Software Project Management	3	3	0	0	50	50	100
3	21UISXXXE	Professional Elective Course- III	3	3	0	0	50	50	100
4	21UISXXXE	Professional Elective Course- IV	3	3	0	0	50	50	100
5	21UISXXXP	Project Work	8	0	0	16	50	50	100
		Total	**20**	**12**	**0**	**18**	**250**	**550**	**500**

VIII Semester

(Applicable students admitted during AY 2021-22 to 1st semester and Lateral Entry AY 2022-23 to 3rd semester, 2024-25 8th Semesters)

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	21UISXXX	MOOC's	3	0	0	0	50	50	100
2	21UISXXX	Intellectual Property Rights	2	2	0	0	50	50	100
3	21UISXXXS	Technical Seminar	1	0	0	2	50	50	100
4	21UISXXX	Research/Industrial Internship-III (24 Weeks)	10	0	0	20	50	50	100
		Total	**16**	**2**	**0**	**22**	**200**	**200**	**400**

Note:

i. MOOC's – student can complete at any time during the course. The credits will be earned during 8th semester (4weeks =1 credit, 8week=2 credits, 12 weeks=3 credits)

ii. Research/Industrial Internship-III- student can complete this as research assistant under a professor working in a recognized research center/ in a research institute/ in any Industry.

3rd Semester NEP 1st Batch

2021-22 Entry Batch

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.

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, S. Chand & company Ltd Advanced Engineering Mathematics. Ram Nagar, New Delhi.
4. E Kreyszig, Advanced Engineering Mathematics

Course Outcomes**

After completion of the course student will be able to

1. The ability to solve engineering problems using non-linear equations and interpolation techniques.
2. The ability to solve problems using numerical differention and numerical integration.
3. Be capable to perform numerical solutions of ordinary differential equations.
4. Fourier analysis provides a set of mathematical tools which enable the engineer to break down a wave into its various frequency components. It is then possible predict the effect of a particular waveform.
5. It is essential to understand the basic concepts of Fourier transforms and z –transforms, to solve ode, pde and difference equations.

Subject Title	**:**	**Logic Design**
Subject code	**:**	**21UIS304C**
Semester	**:**	**03**
Credits with LTP Structure	**:**	**Credits -04(3 L-0T-1P)**
Lecture Hours per Week	**:**	**Hours**
Tutorial Hours per Week	**:**	**Hours**
Total Contact Hours	**:**	**40 (40 Teaching Hours + 00 Tutorial Hours)**

UNIT - I	**10 Hours**	**10 Teaching Hours**	**00 Tutorial Hours**
Boolean Algebra: Definition of Boolean algebra, A two-valued Boolean algebra, Boolean formulas and functions, Canonical Formulas, Manipulations of Boolean formulas **Gates and Combinational networks**: Incomplete Boolean functions and Don't care conditions, Additional Boolean operations and Gates.			
UNIT - II	**10 Hours**	**10 Teaching Hours**	**00 Tutorial Hours**
Simplification of Boolean Expressions: Meanings of Prime implicants and Prime implicates, Karnaugh maps, Using Karnaugh maps to obtain minimal expressions for complete Boolean functions, Minimal expressions of incomplete Boolean functions The Quine-McCluskey method of generating Prime implicants and Prime implicates, Variable-Entered Karnaugh maps.			
UNIT - III	**10 Hours**	**10 Teaching Hours**	**00 Tutorial Hours**
Logic Design with MSI Components and Programmable Logic Devices: Binary adders and subtracters, Decimal adders, Comparators, Decoders, Multiplexers Programmable logic devices (PLDs), Programmable read only memories (PROMs), Programmable logic arrays (PLAs), Programmable array logics devices (PALs).			
UNIT - IV	**10 Hours**	**10 Teaching Hours**	**00 Tutorial Hours**
Flip-Flops and Simple Flip-Flop Applications: The basic Bistable element, Latches, Master-Slave flip-flops (Pulse-Triggered flip-flops), Characteristic equations, Registers, Design of Synchronous Counters **Synchronous sequential networks:** Structure and operation of clocked synchronous sequential networks, Analysis of clocked synchronous sequential networks.			

Text Books: Donald D. Givone, "Digital Principles and Design", McGraw Hill Edition 2002

Reference Books:

1. Leach and Malvino, "Digital Principles and Applications", TMH, New Delhi, 2002.
2. Yarbrough J. M, "Digital logic- Applications and Design, Thomson Learning, New Delhi, 2001.

Subject Title	**:**	**Computer Organization**
Subject Code	**:**	**21UIS302C**
Semester	**:**	**3**
Credits with LTP Structure	**:**	**3Credits(3L--0T-0P)**
Lecture Hours per Week	**:**	**3Hours**
Total Contact Hours	**:**	**40 (40Teaching Hours+00 Tutorial Hours)**

Course Outcomes:

After completing the course the student will be able to:

1. Comprehend the fundamentals of a computing system and its functional units.
2. Write an Assembly Language Program using various types of instructions and addressing modes.
3. Comprehend and Compare the approaches to implement I/O i.e. programmed I/O, interrupt driven I/O and DMA.
4. Comprehend and design various memory organizations.
5. Understandtheconceptsof2'scomplement representation, addition and subtraction operations with this representation, multiplication (BOOTH) and division methods.
6. Comprehend the basics of CPU organization and design of control unit.

UNIT-I	**10Hours**	**Teaching Hours**	**Tutorial Hours**
Basic Structure of a Computer: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic Performance Equation, Clock rate, Performance Measurement. Machine Instructions and Programs: Numbers, Arithmetic Operations and Characteristics, Memory Location and Addresses, Memory Operations. Instructions and Instruction Sequencing: Addressing Modes, Assembly language, Basic Input and Output Operations.		**10**	**00**
UNIT-2	**10Hours**	**Teaching Hours**	**Tutorial Hours**
Input /Output Organization: Accessing I/O Devices, Interrupts-Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses, Interface Circuits: Parallel port: Keyboard to Processor Connection and Printer to Processor Connection, Standard I/O interfaces-USB; Device Characteristics, Architecture, Addressing.		**10**	**00**
UNIT-3	**10Hours**	**Teaching Hours**	**Tutorial Hours**
Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-Wired Control Unit, Micro Programmed Control Unit. Memory System :Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Cache Memories: Mapping Functions.		**10**	**00**
UNIT-4	**10Hours**	**Teaching Hours**	**Tutorial Hours**
Basic Arithmetic Concepts for ALU: Addition and Subtraction of Signed Numbers, Design of Fast Adders; Carry-Look ahead Addition only, Multiplication of Positive Numbers, Signed Operand Multiplication, Integer Division, Floating Point Numbers and Operations.		**10**	**00**

Text Books:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5thedition, TMH,2002.

Reference Books:

1.Computer OrganizationandArchitecture,WilliamStallings,7th edition,PHI,2006

Subject Title	:	**DATA STRUCTURES & ALGORITHMS**
Subject code	:	**21UIS303C**
Semester	:	**3**
Credits with LTP Structure	:	**4 Credits (3L-0P-1T)**
Lecture Hours per Week	:	**3 Hours**
Tutorial Hours per Week	:	**2**
Total Contact Hours	:	**66 (40 Teaching Hours + 26 Tutorial Hours)**

UNIT - I	**16 Hours**	**Teaching Hours**	**Tutorial Hours**
Introduction to data structures: Structures in C. **The stack**: Definition and Examples: Primitive operations, An Example, The stack as an Abstract data type. , Representing Stacks in C: Implementing pop operation, Testing for exceptional conditions, Implementing the push operations. , An Example- Infix, Postfix and Prefix: Basic Definitions and Examples, Evaluating a postfix expression, Program to evaluate a postfix expression, Limitations of the program, Converting an expression from Infix to Postfix, Program to convert an expression from Infix to Postfix. **Recursion**: Recursive definition and processes: The factorial function, Properties of recursive definitions or Algorithms. , Recursion in C: Factorial in C., writing recursive programs: The Towers of Hanoi Problem.		**10**	**6**

UNIT - II	**16 Hours**	**Teaching Hours**	**Tutorial Hours**
Queues: **The queue and its sequential representation**: The queue as an abstract data type, C implementation of queues, The insert operation, The priority queue, Array implementation of a priority queue**.** **Lists:** **Linked lists**: Inserting and removing nodes from a list, Linked implementation of stacks, The getnode and freenode operations, Linked implementation of queues, The linked list as a data structure, Examples of list operations, List implementation of priority queues, Header Nodes.		**10**	**6**

UNIT - III	**17 Hours**	**Teaching Hours**	**Tutorial Hours**
Lists in C: Array implementation of lists, Limitations of the array implementation, Allocating and freeing dynamic variables, Linked lists using dynamic variables, Queues as lists in C, Examples of list operations in C, Noninteger and nonhomogeneous lists, Comparing the dynamic and array implementation of lists, Implementing Header Nodes. , An example:simulation using linked lists.		**10**	**7**

Other list structures: Circular lists, The stack as a circular list, The queue as a circular list, Primitive operations on circular lists, The Josephus problem, Header nodes, Addition of long positive integers using circular lists**.**			
UNIT - IV	**17 Hours**	**Teaching Hours**	**Tutorial Hours**
Trees: Binary trees: Basics, Operation on Binary trees, Applications of Binary trees. Binary tree representations: Node representations of Binary trees, Node Representation of binary trees, Internal & external nodes, Implicit array representation of Binary trees, Choosing a Binary tree representation, Binary tree traversal in c, traversal using a father field, heterogeneous binary trees. **Trees and their applications**: C representation of trees, Tree traversals, General expressions as trees, Evaluating an expression tree, Constructing tree.		**10**	**7**

Text Books:

1) "Data structure using C", Aaron M. Tennenbaum, Yedidyah Langsam and Moshe J. Augenstein, Pearson Education/PHI 2006.

Reference Books:

1) Behrouz A. Forouzan, Richard F. Gilberg , "A Structured Programming Approach Using C", Second Edition, Thomson Brooks/Cole .
2) Behrouz A. Forouzan and Richard F. Gilberg, Thomson, "Computer Science A structured Programming Approach using C", II edition, 2003.
3) Richard F. Gilberg and Behrouz, "Data structures A pseudo code approach with c ", Thomson, 2005.
4) Robert Kruse and Breuse Leung, "Data structures and program Design in C", PEARSON Education, 2007.

Logic Design Laboratory (Code:22UIS380L)

List of assignments
1. Realization of a given Boolean Expression using MEV method. 2. Design and implementation of BCD to Excess-3 using 4-bit Adder Chip and Logic Gates. 3. Design and implement Full adder using 3:8 Decoder (74138). 4. Design and implement Full subtractor using 8:1 multiplexer (74154). 5. Design JK master/slave flip-flop using NAND gates. 6. Design and implementation of 3 bit Mod-n synchronous counter using JK flip-flops (7476) (where n<=8). 7. Design and implementation of Ring counter and Johnson counter using 4-bit shift register. 8. Design and implementation of an Asynchronous Counter using a Decade Counter IC to count up from 0 to n (n<9). Display the count value on 7-segment LED display using BCD to 7-segment code converter IC.
Text Books
1. Donald D. Givone, 2002, "Digital Principles and Design", McGraw Hill Edition 2. Leach and Malvino, 2002, "Digital Principles and Applications", TMH, New Delhi. 3. Yarbrough J. M, 2001, "Digital logic- Applications and Design, Thomson Learning, New Delhi.

Data Structure Laboratory (22UIS381L)

List of assignments

1. Process information of the students using array of structures.
2. Implement integer stack ADT using arrays.
3. Convert infix expression into postfix expression.
4. Solve Towers of Hanoi problem using recursion.
5. Implement integer queue ADT using arrays.
6. Construct singly linked list and implement insertion operation on it.
7. Construct singly linked list and implement deletion operation on it.
8. Implement integer queue ADT using singly linked list.
9. Construct circular linked list and perform insertion operation on it.
10. Construct circular linked list and perform deletion operation on it.
11. Construct binary tree and implement tree traversal methods.

21UMA300M	Bridge Course Mathematics-I	Mandatory - Credits (3 : 0 : 0)
Hours / Week : 03		CIE Marks : 50
Total Hours : 40		SEE Marks : 50

Differential Equations-1	10 Hrs.

Introduction to Differential Equations: Ordinary differential equations of first order**:** Variable separable, Homogeneous. Exact form and reducible to exact differential equations- Integrating factors on $1/N\ (\partial M/\partial y - \partial N/)$ *and* $1/M\ (\partial N/\partial x - \partial M/\partial y)$. Linear and Bernoulli's equation.

(RBT Levels: L1, L2 and L3)

Differential Equations-2	10 Hrs.

Introduction to Higher Order Differential Equations: 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.

(RBT Levels: L1, L2 and L3)

Partial differentiation	10 Hrs.

Introduction to function of several variables: Partial derivatives; Euler's theorem - problems. Total derivatives-differentiation of composite functions. Jacobeans-problems.
(RBT Levels: L1, L2 and L3)

Integral Calculus and Beta, Gamma functions	10 Hrs.

Introduction to Multiple integrals: Evaluation of double and triple integrals. Area bounded by the curve.

Introduction to Beta and Gamma functions: Definitions, Relation between beta and gamma functions-problems.

(RBT Levels: L1, L2 and L3)

References:

1. Maurice D weir, Joel Hass and Frank R. Giordano, "Thomas calculus", Pearson, eleventh edition, 2011
2. B.S. Grewal : Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
3. B. V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Erwin Kreyszing's Advanced Engineering Mathematics volume1 and volume1I,wiley India Pvt.Ltd.,2014

21UHS324C	Universal Human Values-II	Credits: 1
L:T:P - 2 : 1 : 0		CIE Marks: 50
Total Hours/Week: 03		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	04Hrs.

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	04Hrs.

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 RightE valuation: 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	03Hrs.

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. *A Foundation Course in Human Values and Professional Ethics*, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. Teachers'Manualfor*AFoundationCourseinHumanValuesandProfessionalEthics*,RRGaur, R Asthana,G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034- 53-2
3. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak,1999.
4. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi,2004.
5. The Story of Stuff(Book).
6. The Story of My Experiments with Truth - by Mohandas KaramchandGandhi
7. Small is Beautiful - E. F Schumacher.
8. Slow is Beautiful - CecileAndrews
9. Economy of Permanence - J CKumarappa
10. Bharat Mein Angreji Raj – PanditSunderlal
11. Rediscovering India - byDharampal

12.Hind Swaraj or Indian Home Rule - by Mohandas K.Gandhi

13.India Wins Freedom - Maulana Abdul KalamAzad

14.Vivekananda - Romain Rolland(English)

15.Gandhi - Romain Rolland(English)

4rd Semester NEP 1st Batch

2021-22 Entry Batch

21UMA401C	Statistics and Probability Distributions	03 - Credits (3 : 0 : 0)
Hours / Week : 03		CIE Marks : 50
Total Hours : 40		SEE Marks : 50

UNIT – I Statistics **10 Hrs.**

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.

(RBT Levels: L1, L2 and L3)

UNIT – II Probability **10 Hrs.**

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.

(RBT Levels: L1, L2 and L3)

UNIT – III Probability distributions **10 Hrs.**

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

(RBT Levels: L1, L2 and L3)

UNIT – IV Markov chains **10 Hrs.**

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.

(RBT Levels: L1, L2 and L3)

References:

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

Subject Title	**:**	**Analysis And Design Of Algorithms**
Subject code	**:**	**21UIS413C**
Semester	**:**	**4**
Credits with LTP Structure	**:**	**3 Credits (3L-0T-0P)**
Lecture Hours per Week	**:**	**3 Hours**
Tutorial Hours per Week	**:**	**0 Hours**
Total Contact Hours	**:**	**40 (40 Teaching Hours + 00 Tutorial Hours)**

Course Outcomes:

After completing the course the student will be able to:

1. Comprehend fundamentals of various algorithm design techniques.
2. Apply various algorithms to solve engineering problems.
3. Design appropriate algorithms to solve open-ended problems.
4. Analyze time complexity of different types of algorithms.
5. Analyse limitations of various algorithm.

UNIT - I	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Introduction: What is an 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 Nonrecursive Algorithms, Mathematical Analysis of Recursive Algorithms, Example: Fibonacci Numbers.		**10**	**00**

UNIT - II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Brute Force: Selection Sort and Bubble Sort, Sequential Search and Brute-Force String Matching, Exhaustive Search. Divide-and-Conquer: Mergesort, Quicksort, Binary Search, Binary Tree, Multiplication of Large Integers and Stressen's Matrix Multiplication. Decrease-and-Conquer: Insertion Sort, Depth-First Search and Breadth-First Search, Topological Sorting.		**10**	**00**

UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Transform-and-Conquer: Presorting, Balanced Search Trees, Heaps and Heapsort, Problem Reduction. Space and Time Tradeoffs: Sorting by Counting, Input Enhancement in String Matching, Hashing, B-trees. Dynamic Programming: Computing a Binomial Coefficient, Warshall's and Floyd's Algorithms, The Knapsack Problem and Memory Functions.		**10**	**00**

UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees. Limitation of Algorithm Power: Lower-Bound Arguments, Decision Trees. Coping with the Limitations of Algorithm Power: Backtracking, Branch-and-Bound.		**10**	**00**

Text Books:

1. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", 2 nd Edition, [Chapters or Topics: 1, 2.1–2.5, 3.1, 3.2, 3.4, 4.1–4.3, 4.5,5.1–5.4,6.1, 6.3, 6.4, 6.6, 7, 8.1, 8.2, 8.4, 9, 11.1–11.3, 12.1–12.2], Pearson Education, 2007.

Reference Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, "Introduction to Algorithms", 2 nd Edition, PHI, 2006.
2. Horowitz E., Sahni S., Rajasekaran S. "Computer Algorithms", Galgotia Publications, 2001.

Semester	:	**IV**
Subject	:	**OBJECT-ORIENTED PROGRAMMING WITH JAVA**
Subject code	:	**21UIS424C**
Credits	:	**04 (3L-0P-1T)**
Teaching Hours		**40 Lecture, 26 Tutorials.**

UNIT - I

Object-oriented Concepts

OOP Concepts: Procedural Programming, Problems with procedural programming, Object-oriented programming, P.O.P v/s O.O.P, OOP features- Encapsulation, Inheritance, Polymorphism, etc., Benefits of OOP, Applications of OOP, Pure OOP languages-five rules, The 'Object' concept, ADT, Encapsulation and Information Hiding, Class v/s Object, Type and Interface, Instantiating classes, Interaction between objects, Association, Aggregation and Decomposition, Example, Generalization and Specialization, Example. **10 Hours**

UNIT - II

Introduction to Java

Evolution of Java: Java's lineage, Creation of Java, How Java changed the internet, Byte code, Features of Java.
An Overview of Java: Features of Java, First simple program, Lexical Issues.
Data Types and Variables: The Primitive Types, Literals, Variables, Type Conversion and Casting, Automatic Type Promotion.
Operators: Arithmetic operator, Bitwise operators, Relational operators, Boolean Logical operators, Assignment operators, The '?' Operator, Operator precedence.
Control Statements: Java's selection statements, Iteration statements, Jump statements.
Arrays: One-dimensional arrays, Multi-dimensional arrays.

10 Hours

UNIT – III

Classes, Inheritance and Interfaces

Introducing Classes: Class fundamentals, Declaring Objects, Assigning object reference variables, Introducing methods, Constructors, The 'this' keyword.
Methods and Classes: Overloading methods, Introducing Access control, Understanding static, Introducing final.
Inheritance: Inheritance basics- Member access and inheritance, Using super, Multi-level inheritance, Method overriding; Dynamic method dispatch, abstract classes , using 'final' with inheritance.
Interfaces: Defining an interface, Implementing interfaces, Applying Interfaces.

10 Hours

UNIT - IV		
Packages, Exceptions and Threads **Packages:** Packages, Access protection, Importing packages. **Exception Handling:** Fundamentals, Exception types, Uncaught exceptions, Using try and catch, Multiple catch clauses, Nested try statements, throw, throws, Java's built-in exceptions. **Multithreaded programming:** The Java Thread model, The Main thread, Creating a thread, Creating multiple threads, Thread priorities, Synchronization, Interthread communication, Suspending, Resuming and Stopping threads. **10 Hours**		
Text Books	:	1. The Complete Reference -Java, Herbert Schildt, 7th edition, McGraw Hill Publication.
Reference Books	:	

Subject Title	:	**Microcontroller and Embedded Systems**
Subject code	:	**21UIS409C**
Semester	:	**3**
Credits with LTP Structure	:	**3 Credits (3L-0P-0T)**
Lecture Hours per Week		**3 Hours**
Tutorial Hours per Week		**00**
Total Contact Hours	:	**40 (40 Teaching Hours + 00 Tutorial Hours)**

UNIT - I	**10 Hours**	**Teaching Hour**	**Tutorial Hours**
The 8051 Microcontrollers, Assembly Language Programming: Microcontrollers and Embedded systems, Overview of the 8051 family, Inside the 8051, Introduction to 8051 Assembly programming, Assembling and running an 8051 program, the program counter and ROM space in the 8051, 8051 data types and directives, 8051 flag bits and PSW register, 8051 register banks and stack, pin description of the 8051. **Jump, Loop and Call Instructions, I/O Port Programming**: Loop and Jump instructions, Call instructions, Time delay for various 8051 chips, 8051 I/O programming, I/O bit manipulation programming.		**10**	**0**

UNIT - II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
8051 Addressing Modes, Arithmetic, Logic Instructions and Programs: Immediate and register addressing modes, Accessing memory using various addressing modes, Bit addresses for I/O and RAM, Extra 128-byte-on-chip RAM in 8052. Arithmetic instructions, Signed number concepts and arithmetic operations, Logic and compare instructions, Rotate instruction and data serialization, BCD, ASCII, and other application programs.		**10**	**0**

UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
8051 Programming in C, Pin description of 8051: Data types and time delay in 8051 C, I/O programming in 8051 C, Logic operations in 8051 C, Data conversion programs in 8051 C, Accessing code ROM space in 8051 C, Data serialization using 8051 C. **8051 Timer Programming in Assembly and C**: Programming 8051 timers, counter programming, Programming timer 0 and 1 in 8051 C.		**10**	**0**

UNIT - IV	10 Hours	Teaching Hours	Tutorial Hours
8051 Serial Port Programming in Assembly and C: Basics of serial communication, 8051 conversion to RS232, 8051 serial port programming in Assembly, Programming the second serial port, Serial port programming in C. **Interrupts Programming in Assembly and C**: 8051 interrupts, Programming timer interrupts, Programming external hardware interrupts, Programming the serial communication interrupt, Interrupt priority in the 8051/52, Interrupt programming in C.**MOTOR Control:** DC and Stepper Motors.		**10**	**0**

Text Books:

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, " The 8051 Microcontroller and Embedded Systems" using Assembly and C. Pearson 2nd Edition, 2011.
   Chapter 1: 1.1-1.2, Chapter 2: 2.1-2.7, Chapter 3: 3.1-3.3, Chapter 4: 4.1-4.2, Chapter 5: 5.1-5.4, Chapter 6: 6.1-6.5, Chapter 7: 7.1-7.6, Chapter 8: 8.1, Chapter 9: 9.1-9.3, Chapter 10: 10.1-10.5, Chapter 11: 11.1-11.6, Chapter 17: 17.2-17.3

Reference Books:

1. Kenneth J. Ayala, "The 8051 Microcontroller Architecture, Programming and Applications", 2nd Edition, Penram International, 1996.
2. Dr. Uma Rao and Dr. Andhe Pallavi, "The 8051 Microcontroller Architecture, Programming and Applications", Pearson Education Sanguine.
3. V Udayshankar, M S Mallikarjunaswamy, " 8051 Microcontroller: Hardware, Software and Applications", McGrawHill, New Delhi.

Subject Title	:	Operating Systems
Subject code	:	21USI415C
Semester	:	04
Credits with LTP Structure	:	3 Credits (3L-0T-0P)
Lecture Hours per Week	:	3 Hours
Tutorial Hours per Week	:	0 Hours
Total Contact Hours	:	40 (40 Teaching Hours + 00 Tutorial Hours)

UNIT – I	10 Hours	Teaching Hours	Tutorial Hours
OVERVIEW **Introduction:** What Operating Systems Do: User View, System View, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security. **System Structures:** Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design		10	00

UNIT – II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
PROCESS MANAGEMENT **Process Concept:** Operations on Processes. **Process Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling. **Multi-Threaded Programming:** Overview, Multithreading Models, Thread Libraries, Threading Issues. **Process Scheduling:** Thread Scheduling.		10	00

UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
PROCESS COORDINATION **Synchronization:** The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Monitors **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Detection, Recovery from Deadlock. **MEMORY MANAGEMENT**		10	00

UNIT – IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
MEMORY MANAGEMENT **Virtual Memory Management:** Background, Demand Paging, Page Replacement **STORAGE MANAGEMENT**		10	00

File system: File concept, Access Methods, Directory Structure **Implementing File Systems:** File-System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free-Space Management. **Secondary Storage Structure:** Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap-Space Management.		

Text Book:

Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, **"OPERATING SYSTEM PRINCIPLES"**, 7th Edition

Reference Books:

1) D. M. Dhamdhere, "Operating systems - A concept based Approach", 2nd Edition, Tata McGraw-Hill, 2002.
2) P. C. P. Bhatt, "Operating Systems", 2nd Edition, PHI, 2006.
3) Harvey M. Deital, "Operating systems", 3rd Edition, Addison Wesley, 1990.

Subject Title	**:**	**Samskruthika Kannada**
Subject Code	**:**	**21UHS422C**
Semester	**:**	**3**
Credits with LTP Structure	**:**	**1 Credits (1L--0T-0P)**
Lecture Hours per Week	**:**	**1 Hours**
Tutorial Hours per Week	**:**	**0 Hours**
Total Contact Hours	**:**	**15 (15 Teaching Hours + 00 Tutorial Hours)**

Course Outcomes:

After completing the course the student will be able to:

1. «zÁåyðUÀ¼ÀÄ ¨Ë¢ÞPÀªÁV ¨É¼ÉAiÀÄÄªÀÅzÀgÉÆA¢UÉ £ÀªÀÄä £Ár£À ªÀÄvÀÄÛzÉÃ±ÀzÀ ¸ÁA¸ÀÌøwPÀ ªÁgÀ¸ÀÄzÁgÀgÁV ¨É¼ÉzÀÄ ¸ÁéªÀ®A©AiÀiÁV §zÀÄPÀÄ PÀnÖPÉÆ¼ÀÄîvÁÛgÉ.
2. PÀ£ÀßqÀ ¨sÁµÉAiÀÄ£ÀÄß ¸ÀªÀÄxÀðªÁV ªÀiÁvÀ£ÁqÀÄªÀÅzÀgÉÆA¢UÉ, C£ÀågÀ£ÀÄß CxÉÊð¹PÉÆ¼ÀÄîªÀ ªÀÄ£ÉÆÃ§® ¨É¼É¹PÉÆ¼ÀÄîvÁÛ£É. EªÀwÛ£À ¸ÀAQÃtðªÁzÀ ¸ÁªÀiÁfPÀ ªÀåªÀ¸ÉÜAiÀÄ°è ¸ËºÁzÀðAiÀÄÄvÀªÁzÀ £ÀqÀÄªÀ½PÉAiÉÆA¢UÉ ¸ÀA¥À£ÀÆä® ªÀåQÛAiÀiÁV gÀÆ¥ÀÄUÉÆ¼ÀÄîvÁÛ£É.
3. eÁUÀwPÀgÀtzÀÀ ¸ÀAzÀ¨sÀðzÀ°è «zÁåyðUÀ¼ÀÄ ¸ÀévÀAvÀæöªÁVD¯ÉÆÃa¸ÀÄªÀ, ¸ÀévÀAvÀæªÁV §gÉAiÀÄÄªÀ, ¸ÀévÀAvÀæªÁV aAvÀ£À²Ã®gÁUÀÄªÀ ¸ÁªÀÄxÀåðªÀ£ÀÄß ¥ÀqÉzÀÄ, ¸ÀªÀÄAiÉÆÃavÀªÁV ¸ÀÆPÀÛ ¤zsÁðgÀUÀ¼À£ÀÄß PÉÊUÉÆ¼ÀÄîªÀ°è F CzsÀåAiÀÄ£À ¢Ã¥À¸ÀÜA§ªÁVzÉ.
4. «zÁåyðUÀ¼ÀÄ EA¢£À eÁUÀwPÀ «zÀåªÀiÁ£ÀUÀ¼À£ÀÄß CxÉÊð¹PÉÆAqÀÄ, ¸ÀªÀiÁdzÀ°è ¸ÀAWÀfÃ«AiÀiÁV ¨É¼ÉAiÀÄÄªÀ ªÀÄ£ÉÆÃ§®ªÀ£ÀÄß ªÀÄvÀÄÛDvÀä¸ÉÛöÊAiÀÄðªÀ£ÀÄßvÀÄA§ÄªÀ°è F CzsÀåAiÀÄ£À ¸ÀÆPÀÛªÁzÀ ªÀiÁUÀðzÀ²ðPÉAiÀiÁVzÉ.
5. vÀ£Àß C¹ävÉAiÀÄ ºÀÄqÀÄPÁlzÀ°ègÀÄªÀ ªÀåQÛUÉ, CzÀÄ F £É®zÀ ¸Áé©üªÀiÁ£À, ¨sÁvÀÈvÀé, ¦æÃw, ¸ËºÁzÀðAiÀÄÄvÀªÁzÀ ªÀÄ£À¸ÀÄìUÀ¼À°è EzJA§ÄzÀ£ÀÄß «zÁåyðUÀ¼À CjvÀPÉÌvÀgÀÄvÀÛzÉ. «zÁåyðUÀ¼À°è ¥Àj¸ÀgÀ ¥ÀæeÉÕAiÀÄ£ÀÄß eÁUÀÈvÀUÉÆ½¹, zÉÊªÀ¸ÀÈ¶ÖAiÀiÁzÀ F CªÀÄÆ®å ¸ÀA¥ÀvÀÛ£ÀÄß »vÀ-«ÄvÀªÁV §¼À¹PÉÆAqÀÄ ªÀÄÄA¢£À vÀ¯ÉªÀiÁjUÉCzÀ£ÀÄß §¼ÀÄªÀ½AiÀiÁV

©lÄÖºÉÆÃUÀÄªÀ°èeÁUÀÈvÀ£ÁUÀÄvÁÛ£É.			
¨sÁUÀ-I	**04 Hours**	**Teaching Hours**	**Tutorial Hours**
1. PÀ£ÁðlPÀ ¸ÀA¸ÀÌÈw : ºÀA¥À £ÁUÀgÁdAiÀÄå 2. PÀ£ÁðlPÀzÀ KQÃPÀgÀt : MAzÀÄ C¥ÀÇªÀð ZÀjvÉæ - f. ªÉAPÀl¸ÀÄ§âAiÀÄå DqÀ½vÀ ¨sÁµÉAiÀiÁV PÀ£ÀßqÀ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶಮತ್ತು¥ÉÆæ. ವಿ. ಕೇಶವಮೂರ್ತಿ		**04**	**00**
¨sÁUÀ-II	**04 Hours**	**Teaching Hours**	**Tutorial Hours**
1. ªÀZÀ£ÀUÀ¼ÀÄ :ಜೇಡರದಾಸಿಮಯ್ಯ,ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ,ಅಲ್ಲಮಪ್ರಭು,ಆಯ್ದಕ್ಕಿಲಕ್ಕಮ್ಮ, 2. QÃvÀð£ÉUÀ¼ÀÄ : vÀ®ètÂ¸À¢gÀÄ PÀAqÀå vÁ¼ÀÄ - ªÀÄ£ÀªÉ - PÀ£ÀPÀzÁ¸À 3. vÀvÀé¥ÀzÀUÀ¼ÀÄ : ¸Á«gÀ PÉÆqÀUÀ¼À ¸ÀÄlÄÖ - ²±ÀÄ£Á¼À µÀjÃ¥sÀ 4. d£À¥ÀzÀ VÃvÉ : ©Ã¸ÀÄªÀ ¥ÀzÀ		**04**	**00**
¨sÁUÀ-III	**04 Hours**	**Teaching Hours**	**Tutorial Hours**
1. ªÀÄAPÀÄwªÀÄä£À PÀUÀÎ : r.«.f. 2. PÀÄgÀÄqÀÄ PÁAZÁuÁ : zÀ.gÁ. ¨ÉÃAzÉæ 3. ಹೊಸಬಾಳಿನಗೀತೆ: PÀÄªÉA¥ÀÅ 4. ಚೋಮನಮಕ್ಕಳಹಾಡು : ಸಿದ್ಧಲಿಂಗಯ್ಯ ಆಮರಈಮರ : ಚಂದ್ರಶೇಖರಕಂಬಾರ		**04**	**00**
¨sÁUÀ-IV	**03 Hours**	**Teaching Hours**	**Tutorial Hours**
1. qÁ. ¸Àgï JA «±ÉéÃ±ÀégÀAiÀÄå – ªÀåQÛ ªÀÄvÀÄÛ LwºÀå :J J£ï ªÀÄÆwðgÁªï 2. PÀgÀPÀÄ±À® PÀ¯ÉUÀ¼ÀÄ ªÀÄvÀÄÛ ¥ÀgÀA¥ÀgÉAiÀÄ «eÁÕ£À : PÀjÃUËqÀ ©ÃZÀ£ÀºÀ½î ‘PÀ’ ªÀÄvÀÄÛ ‘§’ §gÀºÀ vÀAvÁæA±ÀUÀ¼ÀÄಮತ್ತುPÀ£ÀßqÀzÀ mÉÊ¦AUï		**03**	**00**
Text Books:			
1. ¸ÁA¸ÀÌøwPÀ PÀ£ÀßqÀ (¸ÀA), qÁ.».a.¨ÉÆÃgÀ°AUÀAiÀÄå & qÁ.J¯ï.wªÉÄäÃ±À, Prasaranga VTU, Belagavi, Karnataka, 2020.			
Reference Books:			

Subject Title	**:**	**Balake Kannada**
Subject Code	**:**	**21UHS423C**
Semester	**:**	**3**
Credits with LTP Structure	**:**	**1 Credits (1L--0T-0P)**
Lecture Hours per Week	**:**	**1 Hours**
Tutorial Hours per Week	**:**	**0 Hours**
Total Contact Hours	**:**	**15 (15 Teaching Hours + 00 Tutorial Hours)**

Course Outcomes:

After completing the course the student will be able to:

1. «zÁåyðUÀ¼ÀÄ PÀ£ÀßqÀ ¨sÁµÉAiÀÄ£ÀÄß ¸ÀÄ®¨sÀªÁV CxÉÊð¹PÉÆAqÀÄ, ¸ÁªÀiÁfPÀªÁV, DyðPÀªÁVDAiÀiÁ ¥ÀæzÉÃ±ÀzÀd£ÀgÉÆA¢U ÉC£ÉÆåÃ£ÀåªÁV ªÀåªÀºÀj¸ÀÄvÁÛgÉ.
2. F ¥ÀoÁåzsÀåAiÀÄ£À¢AzÀ «zÁåyðAiÀÄÄDAiÀiÁ ¥ÀæzÉÃ±ÀUÀ¼À £ÀA©PÉ, ¸ÀA¥ÀæzÁAiÀÄ ªÀÄvÀÄÛ DZÀgÀuÉUÀ¼À£ÀÄß ¸ÀÄ®¨sÀªÁV CxÀðªÀiÁrPÉÆ¼Àî®Ä ¸ÁzsÀåªÁUÀÄvÀÛzÉ.
3. PÀ£ÀßqÀ ¸ÀASÉåUÀ¼À ¥ÀjPÀ®à£É¬ÄAzÀ «zÁåyðAiÀÄÄ ªÁtÂdå ªÀåªÀºÁgÀUÀ¼À£ÀÄß ¸ÀÄ®¨sÀªÁV £ÉgÉªÉÃj¸À®Ä ¸ÁzsÀåªÁUÀÄvÀÛzÉ.
4. ºÀAvÀºÀAvÀªÁV «zÁåyðAiÀÄÄ PÀ£ÀßqÀ ¨sÁµÉAiÀÄ°è §gÀªÀtÂUÉAiÀÄPÀ¯ÉAiÀÄ£ÀÄß ªÀÄvÀÄÛNzÀÄªÀPÀ¯ÉAiÀÄ£ÀÄß ¨É¼É¹PÉÆ¼ÀÄîvÁÛ£É.
5. F ¨sÁµÉAiÀÄ ¸ÀA¥ÀPÀð¢AzÁV «zÁåyðAiÀÄÄ PÀ£ÀßqÀ ¸Á»vÀå ¥ÀæPÁgÀUÀ¼ÁzÀ PÀvÉ, PÀªÀ£À, PÁzÀA§j, £ÁlPÀ ªÀÄÄAvÁzÀ PéëÃvÀæUÀ¼À°è vÀ£Àß C©ügÀÄaAiÀÄ£ÀÄß ºÉaÑ¹PÉÆ¼ÀÄîvÁÛ£É

UNIT – I	04 Hours	Teaching Hours	Tutorial Hours
• Necessity of learning a local language: • Tips to learn the language with easy methods. • Easy learning of a Kannada Language: A few tips • Hints for correct and polite conservation • Key to Transcription **Lessons to teach and Learn kannada Language** 1. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತಸರ್ವನಾಮಗಳುಮತ್ತುಪ್ರಶ್ನಾರ್ಥಕಪದಗಳು – Personalpronouns, possessive Forms, Interrogative words 2.ನಾಮಪದಗಳಸಂಬಂಧಾರ್ಥಕರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದಪ್ರಶ್ನೆಗಳುಮತ್ತುಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು – Possessive forms of nouns, dubitive question and Relative nouns 3 ಗುಣ,ಪರಿಮಾಣಮತ್ತುವರ್ಣಬಣ್ಣವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು – Qualitative,Quantitative and Colour Adjectives, Numerals		04	00
UNIT – II	**04 Hours**	**Teaching Hours**	**Tutorial Hours**
1. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳುಮತ್ತುಬಹುವಚನನಾಮರೂಪಗಳು – Ordinal numerals and piural markers 2. ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕಕ್ರಿಯಾಪದಗಳುಮತ್ತುವರ್ಣಗುಣವಾಚಕಗಳು – Defective/Negative Verbs and Colour Adjectives ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ,ನಿರ್ದೇಶನ,ಪ್ರೋತ್ಸಾಹಮತ್ತುಒತ್ತಾಯಅರ್ಥರೂಪಪದಗಳುಮತ್ತು 3. ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imparative words and sentences) 4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧಸೂಚಕಮತ್ತುವಸ್ತುಸೂಚಕಪ್ರತ್ಯಯಗಳುಮತ್ತುನಿಷೇಧಾರ್ಥಕಪದಗಳ ಬಳಕೆ – Comparitive, Rilation ship, identification and Negation words		04	00
UNIT – III	**04 Hours**	**Teaching Hours**	**Tutorial Hours**
1. ಕಾಲಮತ್ತುಸಮಯದಹಾಗೂಕ್ರಿಯಾಪದಗಳವಿವಿದಪ್ರಕಾರಗಳು – Different types of forms of Tense, Time and Verbs 2. ಸಂಭಾಷಣೆಯಲ್ಲಿದಿನೋಪಯೋಗಿಕನ್ನಡಪದಗಳು – Kannada words in Conversation 3. ಕರ್ನಾಟಕರಾಜ್ಯಮತ್ತುರಾಜ್ಯದಬಗ್ಗೆಕುರಿತಾದಇತರೆಮಾಹಿತಿಗಳು 4. ಭಾಷೆಕಲಿಯಲುಏನನ್ನುಮಾಡಬೇಕುಮತ್ತುಮಾಡಬಾರದು – Do's and don'ts in learnig language		04	00

UNIT – IV	03 Hours	Teaching Hours	Tutorial Hours
1. Kannada language script part – 1 2. Kannada language script part – 1		03	00
Text Books:			
1. "BaLake Kannada" - Author : Dr. L Thimmesha Published by Prasaranga, Visvesvaraya Technological University, Belagavi, Karnataka.			
Reference Books:			

21UMA400M	Bridge Course Mathematics-II	Credits - Mandatory L-T-P:(3 : 0 : 0)
Hours / Week : 03		CIE Marks : 50
Total Hours : 40		SEE Marks : 50

Differential Calculus — 10 Hrs.

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

(RBT Levels: L1, L2 and L3)

Vector Differentiation — 10 Hrs.

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

(RBT Levels: L1, L2 and L3)

Laplace Transform — 10 Hrs.

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.

(RBT Levels: L1, L2 and L3)

Inverse Laplace transforms — 10 Hrs.

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

(RBT Levels: L1, L2 and L3)

References:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
2. Erwin Kreyszing's Advanced Engineering Mathematics volume I and volume II, wiley India Pvt.Ltd., 2014.
3. Elementary Differential Equations by Earl D. Rainville and Phillip E, Bedient, Sixth Edition
4. Erwin Kreyszing's Advanced Engineering Mathematics, wiley India Pvt.Ltd.,2014.

5th Semester NEP 1st Batch

2021-22 Entry Batch

Subject Title	:	**DISCRETE MATHEMATICAL STRUCTURES**
Subject code	:	**21UIS519C**
Semester	:	**5**
Credits with LTP Structure	:	**3 Credits (3L-0T-0P)**
Lecture Hours per Week	:	**3 Hours**
Practical Hours per Week	:	**00**
Tutorial Hours per Week	:	**00**
Total Contact Hours per Week	:	**03 (3 Teaching Hours + 00 Tutorial Hours)**

UNIT - I	**10 Hours**	**Teaching Hours**
Fundamentals Principles of Counting: The Rules of sum and product, permutations, combinations: the binomial theorem, combinations with repetition,		**10**

mathematical induction. **Recurrence relation**: first order linear recurrence relation, the second order linear homogeneous recurrence relation with constant coefficient		
UNIT - II	**10 Hours**	
Fundamentals of Logic: Basic connectives and truth tables, Logical equivalence: the laws of logic, logical implication: rules of inference, the use of quantifiers, definitions and the proofs of theorems. **Set Theory:** Sets and subsets, set operations and the laws of set theory.		**10**
UNIT - III	**10 Hours**	
Relations and Functions: Cartesian products and relations, functions: plain and one to one, on to functions: sterling numbers of the second kind, special functions, the pigeonhole principle, function composition and inverse functions, properties of relations, computer recognition: zero one matrices and directed graphs, partial order: Hasse diagram, equivalence relations and partitions, lattices. **Semigroups and Groups**: Definition, example and elementary properties, Homomorphism, Isomorphism.		**10**
UNIT - IV	**10 Hours**	
An introduction to graph theory: Definitions and examples, subgraphs, complement and graph isomorphism, vertex degree: Euler trails and circuits**.** **Trees:** definitions, properties and examples, rooted trees, trees and sorting weighted trees and prefix codes.		**10**
Text Books:		
"Discrete and Combinatorial Mathematics-An Applied Introduction", Ralph P Grimaldi, Pearson Education, 4th and 5th Edition		
Reference Books:		
1. C.L.Lin, "Elements of Discrete Mathematics" 2nd Editions 2. Thomas Khoshy "Discrete Mathematics with applications"		

3. Richard Johasonbangh “Discrete Mathematics” 6th Edition

4. Kenneth H rossey “Discrete Mathematics & etc applications” 6th edition

21IS513C	WEB PROGRAMMING (Integrated)	Credits: 03
L:T:P - 2 : 0 : 2		CIE Marks: 50
Total Hours/Week: 03		SEE Marks: 50

Course Outcomes**

After completion of the course student will be able to

1. Develop web pages using technologies like XHTML and CSS.
2. Develop document using JavaScript.
3. Build dynamic documents using JavaScript and XHTML.
4. Implement web pages using PHP.

UNIT-I	07 Hrs.

XHTML: Basic syntax; Standard XHTML document structure; Basic text markup. XHTML : Images; Hypertext Links; Lists; Tables; Forms; Frames; Syntactic differences between HTML and XHTML. CSS: Introduction; Levels of style sheets; Style specification formats; Selector forms; Property value forms; CSS: Font properties; List properties; Color; Alignment of text; Background images; The

and tags;	
UNIT–II	**08 Hrs.**
Basics of JavaScript: General syntactic characteristics; Primitives, Screen output and keyboard input; Control statements; Object creation and modification, Arrays; Functions; Pattern matching using regular expressions **JavaScript & XHTML Documents:** The Document Object Model, Element Access in JavaScript, Events & Event Handling, Basic Concepts of Event handling, Events, Attributes & Tags, Handling Events from Body Elements, Handling Events from Button Elements, Handling Events from Textbox & password Elements, The Focus Event, Validating from Input, The DOM 2 Event Model, Event Propagation, Event handler registration, An Example of the DOM 2 Event Model, The Navigator Object, DOM Tree Traversal and Modification, DOM Tree Traversal, DOM Tree Modification.	
UNIT–III	**08 Hrs.**
Dynamic Documents with JavaScript: Introduction, Positioning Elements, Absolute Positioning, Relative Positioning, Static Positioning, Moving Elements, Element Visibility, Changing Colors & Fonts, Changing Colors, Changing Fonts, Dynamic Contents, Stacking Elements, Locating the Mouse Cursor, Reacting to the Mouse Click, Slow Movement of Elements, Dragging & Dropping Elements.	
UNIT–IV	**07 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, Files, Cookies, Session Tracking, Database access with PHP and MySQL.	

Laboratory Assignments

1. Design the following static web pages required for an online book store web site.

   1) HOME PAGE: The static home page must contain three frames.

   2) LOGIN PAGE

   3) CATOLOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table

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

   1. First Name (Name should contains alphabets and the length should not be less than 6 characters).

   2. Password (Password should not be less than 6 characters length).

   3. E-mail id (should not contain any invalid and must follow the standard pattern

name@domain.com)

4. Mobile Number (Phone number should contain 10 digits only).

3. Develop and demonstrate JavaScript with POP-UP boxes and functions for the following problems: a) Input: Click on Display Date button using onclick( ) function Output: Display date in the textbox

b) Input: A number n obtained using prompt Output: Factorial of n number using alert

c) Input: A number n obtained using prompt Output: A multiplication table of numbers from 1 to 10 of n using alert

d) Input: A number n obtained using prompt and add another number using confirm Output: Sum of the entire n numbers using alert.

4. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next in the list. Add CSS to customize the properties of the font of the capital (color,bold and font size).

5.a) Design an XHTML web page using CSS, which has two paragraphs as follows:

i) First para – Arial font, 24 pt size, italic, bold, text color blue, background color yellow, underlined, aligned right

ii) Second para – Courier font, 40pt size, small capital letters, over lined, background color white, text color red, aligned center.

b) Develop an XHTML web page to include a background image on some text and then illustrate the properties 'background-repeat' and 'background-position' with different values for each.

6.Develop XHTML document with Java Script to handle events as follows:

i) 'Blur' event to transform the input text to upper case.

ii) 'focus' event to change the background color of a text box.

iii) 'Change' event to display the preferred browser in an alert box when the user relocates the browser from a drop-down menu.

iv) 'click' event to copy the contents of one text into another.

7. Crete and demonstrate an XHTML document using Java Script for event handling as follows: XHTML document should contain a set of radio buttons showing names of web programming tools. On clicking a particular button, event handler should be called to display a brief description about the related tool using an alert box.

8. Develop and demonstrate an XHTML document as follows:
The XHTML document must contain four paragraphs stacked on the top of each other with only enough of each showing so that the mouse cursor can always be placed over the exposed part of any paragraph, it should rise to the top to become completely visible.

9. Write XHTML code to create a table as follows and enter the quantity required.

Product Name	Price/item (Rs)	Quantity
A	20	
B	30	
C	40	

Create a set of radio buttons to accept the payment method need-cheque, cash or card. Develop PHP script to display a result in table, which should contain product name, price, quantity and total cost for each product. Below the table display the total number of ordered items, the total cost and the payment method used.

10. Create an XHTML document to accept the student data which contains student name, branch and college name. Write a PHP document to insert data into the MySQL database and retrieve the particular databased on student name from the database and display.

Reference Books *

5. Programming the World Wide Web - Robert W. Sebesta, 4th Edition, Pearson Education, 2008.
6. Internet & World Wide Web How to program - M. Deitel, P.J.Deitel, A. B. Goldberg, 3rd Edition, Pearson Education / PHI, 2004.
7. Web Programming Building Internet Applications - Chris Bates,3rd Edition, Wiley India, 2006.
8. The Web Warrior Guide to Web Programming - Xue Bai et al,Thomson, 2003.
9. M.Srinivasan: Web Technology Theory and Practice, Pearson Education, 2012.
10. Jeffrey.C.Jackson: Web Technologies-A Computer Science Perspective, Pearson Education, Eleventh Impression, 2012

Subject Title	**:**	**Database Management System**
Subject code	**:**	**21UIS503C**
Semester	**:**	**V**
Credits with LTP Structure	**:**	**Credits (3L-0T-0P)**
Lecture Hours per Week	**:**	**3-Hours**
Tutorial Hours per Week	**:**	**0-Hours**
Total Contact Hours	**:**	**40 (40 Teaching Hours + 00 Tutorial Hours)**

Course Objectives:

1. Get an idea of defining, constructing, manipulating, and sharing databases among various users and applications
2. Learn about database design models, especially come to know about entity-relationship diagrams

3. Acquire knowledge about relational model, relational model constraint, and relational algebra.
4. Understand structured query language.
5. Know about different normal forms and properties of relational decompositions.
6. Learn about transaction management and crash recovery.

UNIT - I	10 Hours	Teaching Hours	Tutorial Hours
INTRODUCTION: Introduction; An example; Characteristics of database approach; Advantages of using DBMS approach; when not to use a DBMS. **Database System Concepts and Architecture:** Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and Client-server architectures; Classification of Database Management systems. **ENTITY-RELATIONSHIP MODEL:** Using High-Level Conceptual Data Models for Database Design; An example database application; Entity types, Entity sets, Attributes and Keys; Relationship types, Relationship sets, Roles and Structural constraints; Weak entity types; Refining the ER Design; ER Diagrams, Naming conventions and design issues; Relationship types of degree higher than two.			

UNIT - II	10 Hours	Teaching Hours	Tutorial Hours
RELATIONAL MODEL AND RELATIONAL DATABASE CONSTRAINTS: Relational model concepts; Relational model constraints and Relational database schemas; Update operations, Transaction and dealing with constraint violations. **Relational Database Design Using ER-to-Relational Mapping** **SQL:** data definition and data types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL queries. Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL.			

UNIT - III	10 Hours	Teaching Hours	Tutorial Hours
DATABASE DESIGN: 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. Properties of relational decompositions; Algorithms for relational database Schema design; Multi-valued dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal forms			

UNIT - IV	10 Hours	Teaching Hours	Tutorial Hours
TRANSACTION MANAGEMENT : Introduction to transaction processing; Transaction & system concepts; Desirable properties of transactions; Characterizing schedules based on recoverability; Characterizing schedules based on serializability; Transaction support in SQL; CONCURRENCY CONTROL: Two-phase locking techniques for concurrency control; **CRASH RECOVERY**: Recovery concepts; Recovery techniques based on deferred update; recovery techniques based on immediate update; shadow paging; The ARIES recovery algorithm;			

Text Book:

"Fundamentals of Database Systems", Remez Elmasri & Shamkant B. Navathe, 7th Edition, Pearson Education;

Reference Books:

1. " Database Management Systems", Ramakrishanan Gehrke 3rd edition, McGraw-Hill Higher Education;
2. "An Introduction to Data base systems"C. J. Date, , Addision Wesley, 4th edition.

Subject Title	**:**	**Data Science using Python**
Subject code	**:**	**21UIS047E**
Semester	**:**	**05**
Credits with LTP Structure	**:**	**3 Credits (3L-0T-0P)**
Lecture Hours per Week	**:**	**3 Hours**
Tutorial Hours per Week	**:**	**0 Hours**
Total Contact Hours	**:**	**40 (40 Teaching Hours + 00 Tutorial Hours)**

UNIT – I	10 Hours	Teaching Hours	Tutorial Hours
Introduction: Data Science, Applications of data science, Data science related to other field, Relationship between data science and Information science, Computational thinking, Skills for data science, Tools for data science Data: Introduction, Data types: Structured Data, Unstructured Data, Challenges with Unstructured Data. Data Collections: Open Data, Social Media Data, Multimodal Data, Data Storage and Presentation. Data Pre-processing: Data Cleaning, Data Integration, Data Transformation, Data Reduction, Data Discretization.		10	00

UNIT – II	10 Hours	Teaching Hours	Tutorial Hours

Techniques: Introduction, Data Analysis and Data Analytics, Descriptive Analysis, Variables, frequency Distribution, Measures of Centrality, Dispersion of a Distribution, Diagnostic Analytics, Correlations, Predictive Analytics, Prescriptive Analytics, Exploratory Analysis, Mechanistic Analysis, Regression. Tools for data science: Python: Introduction, Getting Access to Python, Download and Install Python, Running Python through Console, Using Python through Integrated Development Environment (IDE) , Basic Examples, Control Structures, Statistics Essentials, Importing Data, Plotting the Data, Correlation , Linear Regression, Multiple Linear Regression,		10	00
UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Machine Learning Introduction and Regression: Introduction, Machine Learning, Regression, Gradient Descent Supervised Learning: Introduction, Logistic Regression, Classification with kNN, Naïve Bayes Tools for data science: Python: Introduction to Machine Learning, Classification (Supervised Learning)		10	00
UNIT – IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Unsupervised learning: Introduction, Agglomerative Clustering, Introduction to Reinforcement Learning Tools for data science: Python: Clustering (Unsupervised Learning) Data Collection, Experimentation, and Evaluation: Introduction, Data Collection Methods: Surveys, Survey Question Types, Survey Audience, Survey Services, Analyzing Survey Data, Pros and Cons of Surveys, Interviews and Focus Groups, Why Do an Interview? Why Focus Groups? Interview or Focus Group Procedure, Analyzing Interview Data, Pros and Cons of Interviews and Focus Groups, Log and Diary Data, User Studies in Lab and Field, Picking Data Collection and Analysis Methods: Introduction to Quantitative Methods, Introduction to Qualitative Methods , Mixed Method Studies, Evaluation: Comparing Models, Cross-Validation.		10	00

Text Book:

A hands-on introduction to Data Science, Chirag Shah, Cambridge University Press, 2020.

Reference Books:

1) Data Science from Scratch, Joel Grus, O'Rielly Publications, 2015.

2) Introduction to Data Science, Laura Igual and Santi Segui,

Springer International Publications, 2017.

Subject Title	**:**	**Java Programming**
Subject code	**:**	**21UIS532N**
Semester	**:**	**V**
Credits with LTP Structure	**:**	**Credits (3L-0T-0P)**
Lecture Hours per Week	**:**	**03**
Tutorial Hours per Week	**:**	**0**
Total Contact Hours	**:**	**40 (40 Teaching Hours + 00 Tutorial Hours)**

UNIT - I	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Object-oriented Concepts **OOP Concepts**: Procedural Programming, Problems with procedural programming, Object-oriented programming, P.O.P v/s O.O.P, OOP features-Encapsulation, Inheritance, Polymorphism, etc., Benefits of OOP, Applications of OOP, Pure OOP languages-five rules, The 'Object' concept, ADT, Encapsulation and Information Hiding, Class v/s Object, Type and Interface, Instantiating classes, Interaction between objects, Association, Aggregation and Decomposition, Example, Generalization and Specialization.		**10**	**00**
UNIT - II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Introduction to Java **Evolution of Java:** Java's lineage, Creation of Java, How Java changed the internet, Byte code, Features of Java.		**10**	**00**

An Overview of Java: Features of Java, First simple program, Lexical Issues. **Data Types and Variables:** The Primitive Types, Literals, Variables, Type Conversion and Casting, Automatic Type Promotion. **Operators:** Arithmetic operator, Bitwise operators, Relational operators, Boolean Logical operators, Assignment operators, The '?' Operator, Operator precedence. **Control Statements:** Java's selection statements, Iteration statements, Jump statements.			
UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Arrays, Classes **Arrays:** One-dimensional arrays, Multi-dimensional arrays. **Introducing Classes:** Class fundamentals, Declaring Objects, Assigning object reference variables, Introducing methods, Constructors, The 'this' keyword. **Methods and Classes:** Overloading methods, Introducing Access control, Understanding static, Introducing final.		**10**	**00**
UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Inheritance and Threads **Inheritance:** Inheritance basics- Member access and inheritance, Using super, Multi-level inheritance, Method overriding; Dynamic method dispatch, abstract classes, using 'final' with inheritance. **Multithreaded programming:** The Java Thread model, The Main thread, Creating a thread, Creating multiple threads, Thread priorities, Synchronization, Interthread communication, Suspending, Resuming and Stopping threads.		**10**	**00**
Text Book:			
1. The Complete Reference -Java, Herbert Schildt, 7th edition, McGraw Hill Publication. 2. Programming with Java – A primer, E. Balaguruswamy, 4th edition, McGraw Hill Publication.			
Reference Books:			
1. Java for programmers, Paul J. Deitel and Harvey M. Deitel, Pearson Eduation. 2. Introduction to Java programming, Y. Daniel Liang, 7th edition, Pearson Eduation.			

6th Semester NEP 1st Batch

2021-22 Entry Batch

Subject Title	**:**	**THEORETICAL FOUNDATIONS OF COMPUTER SCIENCE**
Subject code	:	**21UIS615C**
Semester	**:**	**06**
Credits with LTP Structure	**:**	**3 Credits (03L-0T-0P)**
Lecture Hours per Week	**:**	**3 Hours**
Tutorial Hours per Week	**:**	**00**
Total Contact Hours	**:**	**40 (40 Teaching Hours + 00 Tutorial Hours)**

Course Objectives:

1.

Course Outcomes:

After completing the course the 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 patterns.
5. Apply mathematical and formal techniques for solving problems.

UNIT - I	10 Hours	Teaching Hours	Tutorial Hours
Automata: Introduction to Finite Automata, The central concepts of Automata theory. Finite Automata: Deterministic Finite automata, Non-Deterministic Finite Automata. An application of Finite Automata, and Finite Automata with Epsilon-transitions, ***Regular Expressions:*** Regular expressions, Finite Automata and Regular Expressions, and Applications of Regular Expressions		**10**	**00**
UNIT - II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Properties of Regular Languages: Proving languages not to be regular languages, Closure properties of regular languages, Decision properties of regular languages, and Equivalence and Minimization of Automata. **Context Free Grammars and Languages:** Context Free Grammars, Parse trees, Applications of Context Free Grammars, Ambiguity in Grammars and Languages. .		**10**	**00**
UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Pushdown Automata: Definition of the Pushdown Automaton, The languages of a PDA, Deterministic Pushdown Automata. ***Properties of Context-Free Languages***: Normal forms for Context Free Grammars.		**10**	**00**
UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Introduction To Turing Machine: The Turing Machine, Programming Techniques for Turing Machines, Extensions to the basic Turning Machines, Turing Machine and Computers.		**10**	**00**

Text Books:

1. John. E., Hopcroft, Rajeev. Motwani, Jeffrey. D., Ullman, "Introduction to Automata Theory, Languages and Computation", 3rd Edition, Pearson Education, 2007. (Chapters: 1.1, 1.5, 2.2 to 2.5, 3.1 to 3.3, 4, 5, 6.1, 6.2, 6.4, 7.1, 8.1 to 8.4, 8.6)

Reference Books:

1. Peter. Linz, "An Introduction to Formal Languages and Automata", Third Edition, Fifth printing.
2. John, E., Hopcroft, Jeffrey. D. Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publication.
3. A. M., PadmaReddy, "Finite Automata and Formal Languages, Pearson Education,2012

Department Name	:	**Information Science and Engineering**
Semester	:	**6**
Subject	:	**SOFTWARE ENGINEERING**
Subject code	:	**21UIS616C**
Credits	:	**03 (L:03, T:03, P:03)**
Lecture Hours per week	:	**03**
Tutorial Hours per week	:	**00**
Contact Hours per week	:	**03**

UNIT - I **10 Hours**

INTRODUCTION: Evolution- from an art form to an engineering discipline, software development projects, exploratory style of software development, emergence of software engineering, notable changes in software development practices, computer systems engineering.

SOFTWARE LIFE CYCLE MODELS: A few basic concepts, waterfall model and its extensions, rapid

application development, agile development models, spiral model, a comparison of different life cycle models

REQUIREMENTS ANALYSIS AND SPECIFICATION: Requirements gathering and analysis, software requirements specification (SRS).

UNIT - II **10 Hours**

SOFTWARE DESIGN: Overview of the design process, how to characterize a good software design, cohesion and coupling, layered arrangement of Modules, approaches to software design

FUNCTION-ORIENTED SOFTWARE DESIGN: Overview of SA/SD methodology, structured analysis, developing the DFD model of the system, structured design, detailed design, design review

OBJECT MODELLING USING UML: Basic Object-orientation concepts, Unified Modeling Language, UML diagrams, Use case model,, Class diagrams, Interaction diagrams, Activity diagram, State chart Diagram

USER INTERFACE DESIGN: Characteristics of a good user interface, basic concepts, types of user interfaces

UNIT - III **10 Hours**

CODING AND TESTING: Introduction to program testing, Coding, code review, software documentation, testing, unit testing, black – box testing,

White – box testing, debugging, program analysis tools, integration testing, testing object-oriented programs, systems testing

SOFTWARE RELIABILITY AND QUALITY MANAGEMENT: Software reliability, statistical testing, software quality, software quality management system, ISO 9000, SEI capability maturity model

COMPUTER AIDED SOFTWARE ENGINEERING: CASE and its scope, Case Environment, CASE support in software life cycle, other characteristics of CASE tools **10 Hours**

UNIT - IV **10 Hours**

SOFTWARE PROJECT MANAGEMENT: software project management complexities, responsibilities of a software project manager, project planning, metrics for project size estimation, project estimation techniques, COCOMO – a heuristic estimation technique, Staffing level estimation, scheduling, organization and team structures, staffing, risk management, software configuration management

EMERGING TRENDS: client- server software, client server architectures, CORBA, COM/DCOM, Service - oriented architecture (SOA), software as a service (SaaS), **10 Hours**

Text Books	:	Fundamentals of software engineering, Rajib Mall, 4th edition, pHI
Reference Books	:	1. Software Engineering, Ian Somerville, 7th edition, Pearson Education 2. “Software Engineering- A Practitioners Approach”, Pressman R.S, MGH New Delhi. 3. “An integral approach to software Engineering”, Jalote P, Narosa, New Delhi.

Subject Title	**:**	**Computer Networks**
Subject code	**:**	**21UIS617C**
Semester	**:**	**6**
Credits with LTP Structure	**:**	**3 (3-0-0)**
Lecture Hours per Week	**:**	**3 Hours**
Tutorial Hours per Week	**:**	**--**
Total Contact Hours	**:**	**40 (40 Teaching Hours + 00 Tutorial Hours)**

Course Objectives:

1. Understand fundamental concepts of data communication.
2. Familiar with various types of computer networks.
3. Understand the role of each layer in the OSI andTCP/IP Models.
4. Describe the role of the data link layer protocols.
5. Describe the IPv4 and IPv6 addressing structure there packet format and different routing protocols in network layer.
6. Familiarize students with different transport and application layer protocols.

UNIT - I	10 Hours	Teaching Hours	Tutorial Hours
Introduction: Data Communications: Components, Data representations, Data flow, Networks: Distributed Processing, Network Criteria, And Physical structures, Categories of Networks [LAN, WAN, MAN]. **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: physical, data link, network, transport and application layer, Addressing: physical, logical and port addresses. **Physical Layer: Transmission Media**: Guided Media: Twisted pair cable, Coaxial cable, Fiber Optic cable, Unguided Media: Radio waves, Microwaves, Infrared.		**10 Hours**	--
UNIT - II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Switching: Definition, Circuit switched networks, Data gram Networks, Virtual circuit networks. **Data Link Layer: Error detection and correction**: Cyclic codes: Checksum. **Data link control**: Protocols: Noiseless channels: Noisy channels.		**10 Hours**	--
UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Network Layer: Logical Addressing: IPv4 Addresses: Address Space, Notation, Classful Addressing, Classless Addressing, IPv6 Addresses: Structure, Address Space. **Network Layer :Internet Protocol:** IPv4, IPv6, Transition from IPv4 to IPv6 **Network Layer: Address mapping, Error Reporting, and Multicasting:** ARP, RARP, and ICMP. **Network Layer: Delivery, Forwarding & Routing:** Delivery, Forwarding: Routing Table, Unicast routing protocols: Distance vector routing [RIP Description], Link state routing [OSPF Description], Path vector routing [BGP Description].		**10 Hours**	--
UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
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. **Application Layer: Remote Logging, Electronic Mail and File Transfer:** Remote logging: Telnet, Electronic mail: Architecture ,File Transfer: FTP		**10 Hours**	--
Text Books:			
Data Communications and Networking Behrouz A. Forouzan, 4th Edition, Tata McGrawHill, 2006. [**Unit-I:**Chapters 1, 2 ,7 **Unit-II:** Chapters 8, 10, 11 **Unit-III:** Chapters 19,20, 21,22			

Unit-IV: Chapters 23, 24, 25 and 26]
Reference Books:
1) Communication Networks –Fundamental Concepts and Key Architectures Alberto LeonGarcia and IndraWidjaja, 2 nd Edition, Tata McGrawHill,2004. 2) Computer and Communication Networks Nader F. Mir, Pearson Education,2007. 3) Data and Computer Communication William Stallings, 8 th Edition, Pearson Education,2007. 4) Computer Networks – A Systems Approach Larry L. Peterson and Bruce S. David, 4th Edition, Elsevier,2007. 5) Introduction to Data Communications and Networking – Wayne Tomasi, Pearson Education,2005.

Subject Title	:	**INTERNET OF THINGS**
Subject Code	:	**21UIS045E**
Semester	:	**6**
Credits with LPT Structure	:	**03 (3-0-0)**
Lecture Hours Per Week	:	**03**
Total Lecture Hours	:	**40**

UNIT - I	Teaching Hours
Introduction to IoT: What is IoT? Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design: Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Managementand Compute Stack.	**10**
UNIT - II	Teaching Hours
Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects: Communications Criteria, IoT Access Technologies: Salient features of protocol stacks utilizing IEEE 802.15.4 (Intd.): Zigbee Protocol, LoRaWAN	**10**
UNIT – III	Teaching Hours

IP as the IoT Network Layer: The Business Case for IP, the need for Optimization, Optimizing IP for IoT, Application Protocols for IoT: The Transport Layer, IoT Application Transport Methods: CoAP, MQTT Data and Analytics for IoT: An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics.	**10**
UNIT – IV	Teaching Hours
Securing IoT: A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment. IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Installing Software, Fundamentals of Arduino Programming, Example Modules on Arduino: Blinking an LED,Toggle the state of LED using Switch, Traffic light simulation for pedestrians, Interfacing Sensors to the Arduino: Temperature Sensor, Light Sensor, Ultrasonic Sensor, Interfacing Displays to Arduino: 7 Segment Display.	**10**

Text Books:

1) David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN:978 - 9386873743)
2) Srinivasa K G, "Internet of Things", CENGAGE Leaning India, 2017

Reference Books:

1) Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.(ISBN:978-8173719547)
2) Raj Kamal, "Internet of Things: Architecture and Design Principles",1st Edition, McGraw Hill Education, 2017.(ISBN: 978-9352605224)

Subject Title	:	**Data Mining**
Subject code	:	**21UISXXXN**
Semester	:	**6**
Credits with LTP Structure	:	**3 Credits (4L-0P-0T)**
Lecture Hours per Week	:	**3 Hours**
Tutorial Hours per Week	:	**00**
Total Contact Hours	:	**40 (40 Teaching Hours + 00 Tutorial Hours)**
Pre-requisites:	:	**Nil**
Who can register	:	**Students from Any discipline**

Course Objectives:

- To introduce the concepts of Data mining.
- To learn the Data Preprocessing.
- To learn and apply various Data Mining algorithms.
- To know the advanced applications of Data Mining.

Course Outcomes:

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

CO1: Display a comprehensive understanding of Data mining, its role and importance in present scenario.

CO2: Apply various data preprocessing techniques to prepare the given raw input data, assess it and provide suitable data for a range of data mining algorithms.
CO3: Discover useful and interesting associations between various types of items in transactional data using association mining algorithms.
CO4: Apply classification algorithms to real time data.
CO5: Find and evaluate clusters in given real time data and find useful patterns.
CO6: Select and apply the concepts of search engines for retrieving web pages

UNIT - I	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Introduction to data mining: Definition of Data Mining, Motivating Challenges of DM, Data Mining Tasks. Data Preprocessing: Data Attributes, Types of Data, Quality of Data and Data Preprocessing, Measures of Similarity and Dissimilarity.		10	0
UNIT - II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Association Analysis: Definition of Association Analysis, Frequent Item Set Generation, Rule Generation, Compact Representation of Frequent Item Sets. FP Growth Algorithms, Evaluation of Association Patterns		10	0
UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Classification: Preliminaries, Decision Tree Based Classifier, Nearest Neighbor Classifier. Cluster Analysis: Overview, K-means, DBSCAN		10	0
UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Applications: Data Mining Applications, Web Mining, Search Engines		10	0

Reference Books:

1. Introduction to Data Mining with Case Studies, G K Gupta, 3rd Edition, PHI.
2. Data Mining – Concepts and Techniques, Jiawei Han and Michelins Kamber, Morgan Kaufman, 2006, 2nd Edition.
3. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education.

Subject Title	:	Data Science using Python
Subject code	:	21UISXXXN
Semester	:	06
Credits with LTP Structure	:	3 Credits (3L-0T-0P)
Lecture Hours per Week	:	3 Hours
Tutorial Hours per Week	:	0 Hours
Total Contact Hours	:	40 (40 Teaching Hours + 00 Tutorial Hours)

UNIT – I	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Introduction: Data Science, Applications of data science, Data science related to other field, Relationship between data science and Information science, Computational thinking, Skills for data science, Tools for data science Data: Introduction, Data types: Structured Data, Unstructured Data, Challenges with Unstructured Data. Data Collections: Open Data, Social Media Data, Multimodal Data, Data Storage and Presentation. Data Pre-processing: Data Cleaning, Data Integration, Data Transformation, Data Reduction, Data Discretization.		10	00

UNIT – II	10 Hours	**Teaching Hours**	**Tutorial Hours**

Techniques: Introduction, Data Analysis and Data Analytics, Descriptive Analysis, Variables, frequency Distribution, Measures of Centrality, Dispersion of a Distribution, Diagnostic Analytics, Correlations, Predictive Analytics, Prescriptive Analytics, Exploratory Analysis, Mechanistic Analysis, Regression. Tools for data science: Python: Introduction, Getting Access to Python, Download and Install Python, Running Python through Console, Using Python through Integrated Development Environment (IDE) , Basic Examples, Control Structures, Statistics Essentials, Importing Data, Plotting the Data, Correlation , Linear Regression, Multiple Linear Regression,		10	00
UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Machine Learning Introduction and Regression: Introduction, Machine Learning, Regression, Gradient Descent Supervised Learning: Introduction, Logistic Regression, Classification with kNN, Naïve Bayes Tools for data science: Python: Introduction to Machine Learning, Classification (Supervised Learning)		10	00
UNIT – IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Unsupervised learning: Introduction, Agglomerative Clustering, Introduction to Reinforcement Learning Tools for data science: Python: Clustering (Unsupervised Learning) Data Collection, Experimentation, and Evaluation: Introduction, Data Collection Methods: Surveys, Survey Question Types, Survey Audience, Survey Services, Analyzing Survey Data, Pros and Cons of Surveys, Interviews and Focus Groups, Why Do an Interview? Why Focus Groups? Interview or Focus Group Procedure, Analyzing Interview Data, Pros and Cons of Interviews and Focus Groups, Log and Diary Data, User Studies in Lab and Field, Picking Data Collection and Analysis Methods: Introduction to Quantitative Methods, Introduction to Qualitative Methods , Mixed Method Studies, Evaluation: Comparing Models, Cross-Validation.		10	00

Text Book:

A hands-on introduction to Data Science, Chirag Shah, Cambridge University Press, 2020.

Reference Books:

1) Data Science from Scratch, Joel Grus, O'Rielly Publications, 2015.

2) Introduction to Data Science, Laura Igual and Santi Segui,

Springer International Publications, 2017.

7th Semester NEP 1st Batch

2021-22 Entry Batch

Subject Title	**:**	**Object Oriented Modeling and Design**
Subject code	**:**	**21UIS720C**
Semester	**:**	**VII**
Credits with LTP Structure	**:**	**Credits (03-00-00)**
Lecture Hours per Week	**:**	**03**
Tutorial Hours per Week	**:**	**00**
Total Contact Hours	**:**	**40 (40 Teaching Hours + 00 Tutorial Hours)**

UNIT - I	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
INTRODUCTION, MODELING CONCEPTS, CLASS MODELING: Object Orientation, OO development, OO themes; Evidence for usefulness of OO development; OO modeling history. *Modeling as Design Technique:* Modeling; abstraction; the three models. Class Modeling: Object and class concepts; Link and associations concepts;		**10**	**00**

Generalization and inheritance; A sample class model; Navigation of class models; Practical tips. **Advanced Class Modeling:** Advanced object and class concepts; Association ends; N-Ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips.			
UNIT - II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
STATE MODELING, ADVANCED STATE MODELING, INTERACTION MODELING, PROCESS OVERVIEW: **State Modeling:** Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips. **Advanced State Modeling:** Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Practical tips. **Interaction Modeling:** Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models.		**10**	**00**
UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
SYSTEM CONCEPTION, DOMAIN ANALYSIS, APPLICATION ANALYSIS, AND SYSTEM DESIGN-1: **System Conception:** Devising a system concept; Elaborating a concept; Preparing a problem statement.**Domain Analysis:** Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis. **Application Analysis:** Application interaction model; Application class model; Application state model; Adding operations. **System Design -1:** Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy.		**10**	**00**
UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
SYSTEM DESIGN-2, CLASS DESIGN, IMPLEMENTATION MODELING, AND DESIGN PATTERNS: **System Design -2:** Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example. **Class Design:** Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example. **Implementation Modeling:** Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing.		**10**	**00**
Text Books:			
Michael. Blaha, James. Rumbaugh **"Object-Oriented Modeling and Design with UML"**, 2nd Edition, Pearson Education, 2005.			
Reference Books:			

1. **Ali. Bahrami, "Object Oriented Systems Development",** McGraw-Hill, 2008.
2. Grady. Booch **"Object-Oriented Analysis and Design with Applications",** 3rd Edition, Pearson, 2007.
3. Mark. Priestley, **"Practical Object-Oriented Design with UML"**, 2nd Edition, Tata McGraw-Hill, 2003.

Subject Title	**:**	**Software Project Management**
Subject code	**:**	**21UIS718C**
Semester	**:**	**VII**
Credits with LTP Structure	**:**	**Credits (3L-0T-0P)**
Lecture Hours per Week	**:**	**3Hours**
Tutorial Hours per Week	**:**	**Hours**
Total Contact Hours	**:**	**40 (40 Teaching Hours + 00 Tutorial Hours)**

UNIT - I	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT: The importance of Software Project Management, Project Definition, Software Project versus Other Types of Project, Contract Management and Technical Project Management, Activities Covered By Software Project Management, Plans,		**10 Hours**	

Methods, and Methodologies, Stakeholders, Setting objectives, Management Control, Overview of Project Planning – Stepwise Project Planning.			
UNIT - II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
PROJECT EVALUATION: Project Portfolio Management, Evaluation of Individual Projects: Technical Assessment, Strategic Assessment, Cost Benefit Analysis, Cash Flow Forecasting, Cost Benefit Evaluation Techniques, Risk Evaluation. Programme Management, Managing the Allocation of Resources within Programmes, Strategic Programme Management, Creating a Programme, Aids to Programme Management and Benefits Management.		**10 Hours**	
UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
ACTIVITY PLANNING AND RISK MANAGEMENT: Objectives, Project Schedules, Projects and Activities, Sequencing and Scheduling Activities, Network Planning Models, Formulating a Network Model, Forward Pass, Backward Pass, Identifying the critical path, Activity Float, Shortening the Project Duration, Activity on Arrow Networks, Risk Management – Introduction, categories of Risk, Risk Management Approaches, Risk identification, Risk Assessment, Risk Planning, Risk Management, Evaluating Risks to the schedule, Boehm's Top 10 Risks and Counter Measures.		**10 Hours**	
UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
MONITORING AND MANAGING CONTRACTS: Introduction, Creating Framework, Collecting the Data, Review, Visualizing Progress, Cost Monitoring. Managing Contracts – Introduction – Types of Contract – Stages in Contract Placement – Typical terms of a Contract – Contract Management – Acceptance. **MANAGING PEOPLE:** Introduction – Understanding Behavior – Selecting The Right Person For The Job – Instruction in the Best Methods, Motivation, The Oldham-Hackman Job Characteristic Model, Stress, Stress Management, Health and Safety, Some ethical and Professional Concerns.		**10 Hours**	

Text Books:

1. Bob Hughes, Mike Cotterell, and Rajib Mall: Software Project Management – Sixth Edition, Tata McGraw Hill, New Delhi, 2006.

Reference Books:

1. Royce, "Software Project Management", Pearson Education, 1999.
2. Jalote, "Software Project Management in Practice", Pearson Education, 2002.
3. Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2