B.V.V.Sangha's

BASAVESHWAR ENGINEERING COLLEGE, BAGALKOTE

(An Autonomous Institute, Affiliated to Visvesvaraya Technological University, Belagavi)

Karnataka State, India

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Syllabus

Academic Year 2022-23

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	21UIS302C	Computer Organization	3	3	0	0	50	50	100
3	21UIS303C	Data Structures	4	3	2	0	50	50	100
4	21UIS304C	Logic Design	3	3	0	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	0	0	50	50	100
10	21UHS324C	Universal Human Values-II	1	1	0	0	50	50	100
		Total	**18**	**16**	**4**	**8**	**500**	**500**	**1000**

IV Semester
(Applicable students admitted during AY 2021-22 to 2nd 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	21UIS409C	Microcontroller and Embedded Systems	3	3	0	0	50	50	100
3	21UIS413C	Analysis and Design of Algorithms	3	3	0	0	50	50	100
4	21UIS415C	Operating Systems	3	3	0	0	50	50	100
5	21UIS424C	Object Oriented Programming with Java	4	3	2	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	21UMA400M	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 2020-21 to 1st semester and Lateral Entry AY 2021-22 to 3rd semester, 2022-23 5th semester)

Sl. No.	Subject Code	Subject	Credits	Lecture	Tutorial	Practical	CIE	SEE	Total
				Hours/Week			**Examination Marks**		
1	UIS513C	Web Programming	03	3	0	0	50	50	100
2	UIS510C	Software Engineering	03	3	0	0	50	50	100
3	UIS503C	Database Management Systems	04	3	2	0	50	50	100
4	UIS514C	Theoretical Foundations of Computer Science	03	3	0	0	50	50	100
5	UISXXXE	**Professional Elective – I**	03	3	0	0	50	50	100
6	UISXXXN/ UISXXXN/	**Open Elective-I**	03	3	0	0	50	50	100
7	UIS511L	Database Application Laboratory	1.5	0	0	3	50	50	100
8	UIS517L	Web Programming Lab	1.5	0	1	2	50	50	100
9	UHS002N	Advanced Quantitative Aptitude And Soft Skills	01	0	0	0	50	50	100
		Total	**23**	**18**	**3**	**5**	**450**	**450**	**900**

Note: For electives refer the table: List of Electives (3 Credits)

*A student can register online certification course for a maximum of 3 credits from 3rd to 6th semester. However he has to produce the certificate during 7th semester. A student can register 3 courses of 1 cr each/2 courses of 2 cr and 1 cr/1 course of 3 cr in any semester.

Electives Offered	
Subject Code	**Subject Title**
UIS047E	Data Science using Python

Open Electives Offered	
Subject Code	**Subject Title**
UIS531N	Software Engineering
UIS532N	Java Programming

VI Semester
(Applicable students admitted during AY 2020-21 to 2nd semester and Lateral Entry AY 2021-22 to 4th semester, 2022-23 6th semester)

Sl. No.	Subject Code	Subject	Credits	Lecture	Tutorial	Practical	CIE	SEE	Total
				Hours/Week			**Examination Marks**		
1	UIS607C	Software Testing	03	3	0	0	50	50	100
2	UIS623C	Computer Networks	04	3	2	0	50	50	100
3	UIS00XX	**Professional Elective- II**	03	3	0	0	50	50	100
4	UIS00XX	**Professional Elective – III**	03	3	0	0	50	50	100
5	UIS00XX	**Open Elective– II**	03	3	0	0	50	50	100
6	UIS612L	Computer Network Laboratory	1.5	0	0	3	50	50	100
7	UIS616L	Advanced Java Programming laboratory	1.5	0	0	3	50	50	100
8	UIS614P	Mini Project	02	0	0	3	50	50	100
9	UHS003N	Career Planning and Professional Skills	01	2	0	0	50	50	100
		Total	**22**	**17**	**2**	**9**	**450**	**450**	**900**

Note: For electives refer the table: List of Electives (3 Credits)

*A student can register online certification course for a maximum of 3 credits from 3rd to 6th semester. However he has to produce the certificate during 7th semester. A student can register 3 courses of 1 cr each/2 courses of 2 cr and 1 cr/1 course of 3 cr in any semester.

Scheme of Teaching and Evaluation

VII Semester

(Applicable students admitted during AY 2019-20 to 1st semester and Lateral Entry AY 2020-21 to 3rd semester,

2021-22 5th semester, 2022-23 7th semester)

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	UIS720C	Object Oriented Modeling and Design	03	3	0	0	50	50	100
2	UIS718C	Software Project Management	03	3	0	0	50	50	100
3	UISXXXE	**Professional Elective- IV**	03	3	0	0	50	50	100
4	UISXXXE	**Professional Elective- V**	03	3	0	0	50	50	100
5	UISXXXN	**Open Elective– II**	03	3	0	0	50	50	100
6	UIS707L	Object Oriented System Design Lab	1.5	0	0	3	50	50	100
7	UIS716L	Software testing Lab	1.5	0	0	3	50	50	100
8	UIS717P	Project Phase – I	05	0	0	5	50	50	100
9	UIS718I	Internship	02	0	0	4	50	50	100
		Total	**25**	**15**	**2**	**15**	**450**	**450**	**900**

VIII Semester

(Applicable students admitted during AY 2019-20 to 2nd semester and Lateral Entry AY 2020-21 to 4th semester,

2021-22 6th semester 2022-23 8th semester)

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	UISXXXE	**Professional Elective – VI**	03	3	0	0	50	50	100
2	UISXXXE	**Professional Elective – VII**	03	3	0	0	50	50	100
3	UIS806P	Project Phase – II	12	0	0	12	50	50	100
4	UIS807S/ UISXXXO	Seminar/ Online course	01	0	0	2	50	50	100
		Total	**19**	**6**	**0**	**14**	**200**	**200**	**400**

Electives Offered	
Subject Code	**Subject Title**
UIS033E	Distributed cloud computing
UIS019E	Data Mining
UIS039E	NoSQL

Subject Title	:	**Numerical Techniques and Integral Transforms**
Subject code	:	**21UMA301C**
Semester	:	**3**
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. 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.

UNIT - I	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
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).		**10**	**00**
UNIT - II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
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 4th order method.		**10**	**00**
UNIT - III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
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.		**10**	**00**
UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
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.		**10**	**00**

Text Books:

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.

Reference Books:

1. Advanced Engineering Mathematics by E Kreyszig   (John Wiley & Sons)

Subject Title	:	Computer Organization
Subject Code	:	21UIS302C
Semester	:	3
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 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. Understand the concepts of 2's complement 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		10 Hours	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		10 Hours	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		10 Hours	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		10 Hours	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, Zvonko Vranesic, Safwat Zaky, 5th edition, TMH, 2002.

Reference Books:

1. Computer Organization and Architecture, William Stallings,7th edition,PHI,2006

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

Course Outcomes:

After completing the course the student will be able to:

1. Write C programs using   advanced C programming concepts.
2. Develop algorithms to simulate various linear   data structures like stack, queues and linked lists.
3. Implement C programs using recursion to solve various problems.
4. Develop algorithms to simulate non linear data structures like Binary tree, Binary search tree.
5. Implement open-ended applications using linear and non-linear data structures

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. **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**.**		10	7

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.

Subject Title	:	Logic Design
Subject Code	:	**21UIS304C**
Semester	:	**3**
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:

7. Implement the Boolean formulas with universal gates by representing them in canonical formulas.
8. Simplify the Boolean formulas using Kmaps, Quine McClusky,decimal method, MEV method.
9. Realize the Boolean formulas using MSI components.
10. Design programmable logic devices.
11. Construct registers and counters using asynchronous and synchronous sequential circuits.

UNIT-I	10 Hours	Teaching Hours	Tutorial Hours
Boolean Algebra and Combinational Networks: Definition of 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		**10**	**00**

UNIT-2	10 Hours	Teaching Hours	Tutorial Hours
Simplifications of Boolean Expressions: Formulations of simplification problem, Prime implicants and Irredundant disjunctive expressions, Prime implicates and Irredundant conjunctive expressions, 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, Decimal method for obtaining prime implicants, Variable-Entered Karnaugh maps.		**10**	**00**

UNIT-3	10 Hours	Teaching Hours	Tutorial Hours
Logic Design with MSI Components and Programmable Logic Devices: Binary adders and subtracters, Decimal adders, Comparators, Decoders, Multilpexers Programmable logic devices (PLDs), Programmable read only memories (PROMs), Programmable logic arrays (PLAs), Programmable array logics (PALs)		**10**	**00**

UNIT-4	10 Hours	Teaching Hours	Tutorial Hours
Flip-Flops and Simple Flip-Flop Applications: The basic Bistable element, Lathes, Master-Slave flip-flops (Pulse-Triggered flip-flops), Edge triggered flop-flops, Characteristic equations, Registers Counters, Design of Synchronous Counters, **Synchronous sequential networks:** Structure and operation of clocked synchronous sequential networks, Analysis of clocked synchronous sequential networks		**10**	**00**

Text Books:
1. Donald D. Givone, "Digital Principles and Design", McGraw Hill Edition 2002: Chapter 3: 3.1, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, Chapter 4: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.8, 4.11, 4.14 Chapter 5: 5.1, 5.2, 5.3, 5.4, 5.6, 5.7, 5.8, 5.9, 5.10, Chapter 6: 6.1, 6.2, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9 Chapter 7: 7.1, 7.2

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

Subject Title	:	Bridge Course Mathematics-I
Subject code	:	21UMA300M
Semester	:	3
Credits with LTP Structure	:	Mandatory
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. Apply the concepts of polar curves to solve Engineering problems.
2. Apply the knowledge of partial differentiation to solve Engineering problems.
3. Apply the concepts of multiple integrals and their usage in computing the area and volumes.
4. Evaluate improper integrals using beta and gamma functions.
5. Apply the knowledge of differentiation of vectors to solve the engineering problems.

UNIT - I	10 Hours	Teaching Hours	Tutorial Hours
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		10	00

UNIT - II	10 Hours	Teaching Hours	Tutorial Hours
Partial differentiation: Introduction to function of several variables, Partial derivatives; Euler's theorem - problems. Total derivatives-differentiation of composite functions. Jacobians-problems		10	00

UNIT - III	10 Hours	Teaching Hours	Tutorial Hours
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.		10	00

UNIT - IV	10 Hours	Teaching Hours	Tutorial Hours
Vector Differentiation: Scalar and vector fields. Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- problems		10	00

Text Books:

1.

Reference Books:

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, 44 th Edition, 2017.

3. B. V. Ramana: "Higher Engineering Mathematics" 11 th Edition, Tata McGraw-Hill, 2010.

4. Erwin Kreyszing's Advanced Engineering Mathematics volume1 and volume1I,wiley India Pvt.Ltd.,2014

Subject Title	:	**Constitution of India**
Subject code	:	**21UHS321C**
Semester	:	**4**
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. Understand and explain the significance of Indian Constitution as the fundamental law of the land.
2. Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.
3. Analyse the Indian political system, the powers and functions of the Union, State and Local Governments in detail.
4. Elaborate Electoral Process, Emergency provisions and Amendment procedure.

UNIT - I	04 Hours	Teaching Hours	Tutorial Hours
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.		**04**	**00**

UNIT - II	04 Hours	Teaching Hours	Tutorial Hours
The Union and State Governments: The Union Executive, The Union Legislature and The Union Judiciary - The Supreme Court of India.		**04**	**00**

UNIT - III	04 Hours	Teaching Hours	Tutorial Hours
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 73 rd and Urban Local Self Govt. with special reference to74 th Amendment.		**04**	**00**

UNIT - IV	03 Hours	Teaching Hours	Tutorial Hours
Election provisions, Emergency provisions, Amendment of the constitution:		**03**	**00**

Text Books:

1. An introduction to the constitution of India and Profession Ethics, Venkatesh B. R. and

   Merunandan K. B., Idea International Publication, Bangalore.

2. M. V. Pylee, "Introduction to the Constitution of India", 4 th Edition, Vikas publication, 2005.

3. The Constitution of India and Profession of Ethics, K. R. Phaneesh, Sudha Publication, Bangalore.

Reference Books:

1. Durga Das Basu (D. D. Basu), "Introduction to the constitution of India", (Student Edition), 19 th

   edition, Prentice-Hall EEE, 2008.

2. Engineering Ethics: Charles Harries J. R. and Michard and Michael J. Rabins

Subject Title	:	**Universal Human Values-II**
Subject Code	:	**21UHS324C**
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. Explore holistic vision of life - themselves and their surroundings.
2. Develop competence and capabilities for maintaining Health and Hygiene.
3. Analyse various problems in life, family,Society and 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.

UNIT-I	**04 Hours**	**Teaching Hours**	**Tutorial Hours**
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.		**04**	**00**

UNIT-2	**04 Hours**	**Teaching Hours**	**Tutorial Hours**
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.		**04**	**00**

UNIT-3	**04 Hours**	**Teaching Hours**	**Tutorial Hours**
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 Right Evaluation: 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.		**04**	**00**

UNIT-4	**03 Hours**	**Teaching Hours**	**Tutorial Hours**
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		**03**	**00**

Text Books:
Reference Books:

2. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria,2 nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034- 47-1
3. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2 nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-53-2
4. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
5. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
6. The Story of Stuff (Book).
7. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
8. Small is Beautiful - E. F Schumacher.
9. Slow is Beautiful - Cecile Andrews.
10. Economy of Permanence - J C Kumarappa
11. Bharat Mein Angreji Raj – Pandit Sunderlal.
12. Rediscovering India - by Dharampal.
13. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
14. India Wins Freedom - Maulana Abdul Kalam Azad
15. Vivekananda - Romain Rolland (English)
16. Gandhi - Romain Rolland (English)

Subject Title	:	**Statistics and Probability Distributions**
Subject code	:	**21UMA401C**
Semester	:	**3**
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. 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.

UNIT - I	10 Hours	Teaching Hours	Tutorial Hours
Statistics: Curve fitting by the method of least squares:. Correlation, expression for the rank correlation coefficient and regression.		**10**	**00**

UNIT - II	10 Hours	Teaching Hours	Tutorial Hours
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.		**10**	**00**

UNIT - III	10 Hours	Teaching Hours	Tutorial Hours
Probability distributions: Binomial distributions, Poisson distributions and Normal distributions. Concept of joint probability, Joint probability distributions.		**10**	**00**

UNIT - IV	10 Hours	Teaching Hours	Tutorial Hours
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.		**10**	**00**

Text Books:

1.

Reference Books:

1. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.

2. Theory and problems of probability by Seymour Lipschutz (Schaum's Series).

3. Advanced Engineering Mathematics by H. K. Dass

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 2 nd edition 2012.

6. Advanced Engineering Mathematics by Peter V. O'Neil.

Subject Title	:	Microcontroller and Embedded Systems
Subject code	:	21UIS409C
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 the fundamentals of microprocessor and microcontroller architectures.
2. Develop assembly language programs for 8051 Microcontroller using Keil tool.
3. Use Timers/Counters/Interrupts components to solve engineering problems.
4. Generate various waveforms using Serial Ports for developing basic communication systems.
5. Develop appropriate interfaces to control various hardware units.

UNIT - I		10 Hours	Teaching Hours	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	00

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	00

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	00

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	00

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	:	**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.

Subject Title	:	Operating System
Subject code	:	UIS415C
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 the principles of operating system.
2. Select appropriate scheduling algorithm for efficient resource utilization.
3. Identify race conditions to avoid and resolve deadlocks.
4. Apply various memory management approaches for efficient utilization of memory.
5. Apply secured file accessing and disk scheduling algorithms.

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 and Implementation, Operating-System Structure		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, MultipleProcessor 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 Memory Management Strategies: Background, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.		10	00

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

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "OPERATING SYSTEM PRINCIPLES", 7th Edition, [Chapters or Topics: 1.1, 1.4–1.9, 2.1–2.7, 3.1–3.3, 4.1– 4.4, 5.1–5.5, 6.1–6.5,6.7, 7.1-7.4, 7.6,7.7,8.1–8.6, 9.1, 9.2, 9.4, 10.1-10.3, 11.1–11.5, 12.1–12.6], Wiley–India, 2006.

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	:	**Object-Oriented Programming With Java**
Subject code	:	**21UIS424C**
Semester	:	**4**
Credits with LTP Structure	:	**4 Credits (3L-1T-0P)**
Lecture Hours per Week	:	**3 Hours**
Tutorial Hours per Week	:	**2 Hours**
Total Contact Hours	:	**66 (40 Teaching Hours + 26 Tutorial Hours)**

Course Outcomes:

After completing the course the student will be able to:

1. Apprehend the fundamental concepts of object-oriented programming.
2. Implement basic Java programs and its features.
3. Develop programs using the concepts of classes and objects, constructors and method overloading.
4. Apply the concepts of inheritance, interfaces and packages.
5. Deploy standard applications using the principles of multithreading and exception handling mechanism.

UNIT - I	16 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, Example.		10	6

UNIT - II	16 Hours	Teaching Hours	Tutorial Hours
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	6

UNIT - III	17 Hours	Teaching Hours	Tutorial Hours
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	7

UNIT - IV	17 Hours	Teaching Hours	Tutorial Hours
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	7
Text Books:			
1. The Complete Reference -Java, Herbert Schildt, 7th edition, McGraw Hill Publication.			
Reference Books:			

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 ¨É¼ÉAiÀÄÄªÀÅzÀgÉÆÄ¢UÉ £ÀªÀÄä £Ár£À ªÀÄÄvÀÄÛzÉÃ±Àzì ¸ÁA¸ÌøwPÀ ªÁgÀ¸ÀÄzÁgÀgÁV ¨É¼ÉzÀÄ ¸Áéª®A©AiÀiÁV §zÀÄÄPÀÄ PÀnÖPÉÆ¼ÀÄîvÁÛgÉ.

2. PÀ£ÀßqÀ ¨ sÁµÉAiÀÄ£ÀßÄ ¸ÀªÀÄxÀðªÁV ªÀiÁVÀ£ÁqÀÄÄ¢ÀÅzÀgÉÆA¢UÉ, C£ÀågÀ£ÀÄß CxÉÊð1PÉÆ¼ÀÄî¢ªÀ ªÀÄ¼É§® ¨É¼É1PÉÆ¼ÀÄîvÁÛ¼É. EªÀÛ¼À ¸ÀAQÃtðÁzÀ ¸ÁÀiÁfPÀ ªÀªÀ¸ÉÜAiÀÄ°è ¸ÌÁzÀðAiÀÄÄÄÄvÀªÁzÀ £ÀqÀÄÄÄ½PÉAiÉÆA¢UÉ ¸ÀA¥À£ÀÆä ªÀåQÛAiiÀV gÀÆ¥ÀÄÄUÉÆ¼ÀÄîvÁÛ¼É.

3. eÀUÀwPÀgÀtzÀÀ ¸ÀAzÀ¨sÀðzÀ°è «zÁåyðUÀ¼ÀÄ ¸ÀévÀÄAvÀæö ÁVD¯ÉÃÃa¸ÀÄÀªÀÄ¸À, ¸ÀévÀÄAvÀæÁV §gÉAiÀÄÄÄÄ¢À, ¸ÀévÀÄAvÀæÁV aAvÀ£À²Ã®gÀÄÄÄÄ¢À ¸ÁÀÄxÀ¼ðÀ£À£ÀÄÄ ¥ÀqÉzÀÄ, ¸ÀªÀÄÄiÉ ÃavÀÄÄÄ¢À ¸ÀÆPÀÛ ¤zsÁðgÀUÀ¼À¼ÀÄÄÄÄ¢À PÉÊUÉÆ¼ÀÄî¢À°è F CzsÀåAiÀÄ£À ¢Ã¥À ¸ÀÜA¥ÀÅzÉ.

4. «zÁåyðUÀ¼ÀÄ EA¢À eÀUÀwPÀ «zÀåªiÀiÁ£ÀUÀ¼ÀÄÄÄ¢À CxÉÊð1PÉÆªÀÀÄ, ¸À¼ÀAiiÀÄÄdzÀ°è ¸ÀAWÀfÃ«AiÀiÀV ¨É¼ÉAiÀÄÄªÀ ªÀÄ¼ÉÃ§®ªÀ£À£ÀÄÄ ªÀÄÄÄvÀÄÄÄÛvÀä¸ÉûöÊEAiÀÄÄ¢À£ÀÄÄÄ¢ÀÄvÀÄÄÄA§Ä°è F CzsÀåAiÀÄ£À ¸ÀÆPÀÛ¼ÀÁzzì ªÀÄ¼ÉÄ¢À²ðPÀAiÀÄÄ¢ÀÄ¢.

5. vÀ£ÀÄß C¹ävÉAiÀÄÄ ºÀÄqÀÄÄPÁlzÀ°è°gÀÀÄ¢ ªÀÄ¼Ä QÛ°É, CzÄ F £É®zÀ ¸Áé©üªÀiÁ£À¢À, ¨ sÀªÀÀÈÀé, ¦æÄãw, ¸Áñ¼ÀÄµÀtzÀÀ¢À ¸ÀÄ¢z¼ÀÄiÀ¼ À°è EzJA§Ä¼ÀÄÄÄÄ¢ «zÁåyðUÀÄ CjvÀÄUÉ¼ÀÄ¢vÀÄÄÄ¢zÉ. «zÁåyð°è ¼ÀÄ¼j¸Á¼Ä ¼ÀÄeeÉÕÉÄ¢À¼ÀÄÄÄ¢À eÀUÀ¼vÀÄÄUÉ¼½1, zÉÊÀ ¸À¶ÖAiÀÄÄÄ¢Ázzì F CªÀÄÄÄ®å ¸ÀÄ¢Àv¼À¼ÀÄÄÄ¢À »vÀÄÄ-«ÄÀvÀÄUÁV §¼À¹1PÉÄAiÀÄÀ ªÀÄÄ¢ÄA¢À vÀÀ¯ÉªÀiÁjUÉCzÀ£À¼ÀÄÄ¼ÀÄ¢À §¼À¼ÀÄ¢AiAiÀiÀV ©ÄÖÖºÉÆÃUÀÄ¢À¢À°èeÀÄÄÄÄvÀ£ÀÄÄÄ¢ÀÄvÀÄ.

¨sÁUÀ-I	04 Hours	Teaching Hours	Tutorial Hours
1. PÀ£ÀÁðlPÀ ¸ÀA¸ÀÌÈw : ºÀÄ¤À £ÀUÀgádAiÀÄÄÄÄÄå 2. PÀ£ÀÁðlPÀzÀ KQÃPÀgÀt : MAzÀÀ C¥ÀÇ¥Àð ZÀjvÉæ - f.		04	00

ªÉAPÀ¸ÀÄ§âAiÀÄÅ			
DqÀ½vÀ ¨sÁµÉAiÀÄiÁV PÀ£ÀßqÀ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶಮತ್ತು¥ÉÆÆ. ವಿ. ಕೇಶವಮೂರ್ತಿ			

¨sÁUÀ-II	04 Hours	**Teaching Hours**	**Tutorial Hours**
1. ªÀZÀ£ÀUÀ¼ÀÄ :ಜೇಡರದಾಸಿಮಯ್ಯ,ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ,ಅಲ್ಲಮಪ್ರಭು,ಆಯ್ದಕ್ಕಿಲಕ್ಕಮ್ಮ, 2. QÃvÀð£ÉUÀ¼ÀÄ : vÀ®è±À¸À¢gÀÄ PÀ£ÀqÀå 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 : ಸಿದ್ದಲಿಂಗಯ್ಯ 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 vÀÀAvÀÆ±ÀUÀ¼ÀÄ ಮತ್ತುPÀ£ÀßqÀzÀ mÉÊ¦AUï	**03**	**00**	

Text Books:

1. ¸ÁA¸ÌÀØwPÀ PÀ£ÀßqÀ (¸ÀA), qÁ.».a.¨ÉÆÃgÀ°AUÀAiÀÄå & qÁ.J¯¨ï.wªÀÄäÃ±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, DyðPÀªÁVDAiÀÄiÁ ¥ÀæzÉÃ±ÀzÀd£ÀgÉÆA¢U ÉC£É£ÃåÃ£Àå¼ÀªÁV ªÀåªÀºÀj¸ÀÄvÁ ÛgÉ.

2. F   ¥ÀoÁåzsÀåAiÀÄ£À¢AzÀ   «zÁåyðAiÀÄÄÄDAiÀÄiÁ   ¥ÀæzÉÃ±ÀÄÀ¼À   £ÀA©PÉ, ¸ÀA¥ÀæzÁAiÀÄ   ªÀÄvÀÄÛ   DZÀgÀuÉÀ¼À£Àß   ¸ÀÄ®¨sÀªÁV   CxÀðªÀiÁrPÉÆ¼Àî¨ Ä ¸ÁzsÀåªÁUÀÄvÀÛzÉ.

3. PÀ£ÀßqÀ ¸ÀASÉåÀ¼À ¥ÀjPÀ®£É¬ÄAzÀ «zÁåyðAiÀÄÄ ªÁtådå ªÀåªÀºÁgÀUÀ¼À£Àß ¸ÀÄ®¨sÀªÁV £ÉgÉªÉÃj¸À Ä ¸ÁzsÀåªÁUÀÄvÀÛzÉ.

4. ºÀAvÀºÀAvÀªÁV «zÁåyðAiÀÄÄ PÀ£ÀßqÀ ¨sÁµÉAiÀÄ°è §gÀªÀtâUÉAiÀÄ£ÀPÀ¯ÉAiÀÄ£Àß ªÀÄvÀ£ÀÄ ÛNzÀ£ÀPÀ¯ÉAiÀÄ£Àß ¨É¼É¹PÉ¼À¼ÀîvÁÛ¼É.

5. F ¨sÁµÉAiÀÄ ¸ÀA¥À£ðÃzÀ «zÁåyðAiÀÄÄ PÀ£ÀßqÀ ¸Á»vÀå ¥ÀæPÁgÀUÀ¼ÁzÀ PÀvÉ, PÀªÀ£À, PÁzÀA§j, £ÁlPÀ ªÀÄÄÄ£vÁ£ÀªvÁzÀ PÉëÃvÀ¼æ¼À°è vÀ£Àß C©üªÀÄÄ£ÀÄ£Àß ºÉaÑ¹PÉ¼ÀîvÁ£Û¼É

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		**04**	**00**

		Teaching Hours	Tutorial Hours

- 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

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), ಸಂಬಂಧಸೂಚಕಮತ್ತುವಸ್ತುಸೂಚಕಪ್ರತ್ಯಯಗಳುಮತ್ತುನಿಷೇಧಾರ್ಥಕಪದ ಗಳ 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,

Reference Books:

Subject Title	:	**Bridge Course Mathematics-II**
Subject code	:	**21UMA400M**
Semester	:	**3**
Credits with LTP Structure	:	**Mandatory**
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. 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. Apply Inverse Laplace transforms to solve differential equations.

UNIT - I	10 Hours	Teaching Hours	Tutorial Hours
Differential Equations-1: Ordinary differential equations of first order: Variable seperable, Homogeneous. Exact form and reducible to exact differential equations. Linear and Bernoulli's equation.		**10**	**00**

UNIT - II	10 Hours	Teaching Hours	Tutorial Hours
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.		**10**	**00**

UNIT - III	10 Hours	Teaching Hours	Tutorial Hours
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.		10	00
UNIT - IV	10 Hours	Teaching Hours	Tutorial Hours
Inverse Laplace transforms: Properties, Convolution theorem-problems, Solutions of linear differential equations.		10	00

Text Books:
1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44 th Edition, 2017.
2. Erwin Kreyszing's Advanced Engineering Mathematics volume I and volume II,wiley India Pvt.Ltd.,2014.
3. H K Das, Higher Engineering Mathematics

Reference Books:
1. Erwin Kreyszing's Advanced Engineering Mathematics,wiley India Pvt.Ltd.,2014.
2. Elementary Differential Equations by Earl D. Rainville and Phillip E, Bedient, Sixth Edition.

Subject Title	:	Web programming		
Subject code	:	UIS513C		
Semester	:	5		
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. Develop web pages using technologies like XHTML, CSS and XML.
2. Develop JavaScript scripts for event handling.
3. Build dynamic documents using JavaScript and XHTML.
4. Implement web pages using PHP.
5. Develop web pages using Ruby language.

UNIT - I	10 Hours	Teaching Hours	Tutorial Hours
FUNDAMENTALS OF WEB, XHTML - Internet, HTTP request and HTTP response phase, MIME, The Web Programmers Toolbox. **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 <span> and <div> tags; HTML5 and CSS3 Fundamentals		**10**	**00**

UNIT - II	10 Hours	Teaching Hours	Tutorial Hours
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. Dynamic scope, Explicit binding, Object oriented prototypes		**10**	**00**

UNIT - III	10 Hours	Teaching Hours	Tutorial Hours
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. **Introduction to XML:** Introduction, The Syntax of XML, XML Document Structure, Document Type Definitions: Declaring Elements, Declaring Attributes, Declaring Entities, A Sample DTD, Internal & External DTDs, Namespaces, XML Schemas: Schemas Fundamentals, Defining the Schema, Defining the		**10**	**00**

Schema Instances, An Overview of Data types, Simple Types, Complex Types, Displaying Raw XML Documents, Displaying XML Documents with CSS, Displaying XML documents with CSS; XSLT style sheets; XML processors;			
UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
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. PHP with Ajax, Object oriented programming in PHP **Ruby :** Origins and uses of Ruby, Scalar types and their operations, Simple input and output, Control statements, Arrays, Hashes, Methods, Classes, Code blocks and iterators, Pattern matching.		**10**	**00**

Text Books:
1. Programming the World Wide Web - Robert W. Sebesta, 4th Edition, Pearson Education, 2008.
Reference Books:
1. Internet & World Wide Web How to program - M. Deitel, P.J.Deitel, A. B. Goldberg, 3rd Edition, Pearson Education / PHI, 2004.   2. Web Programming Building Internet Applications - Chris Bates,3rd Edition, Wiley India, 2006.   3. The Web Warrior Guide to Web Programming - Xue Bai et al,Thomson, 2003.   4. M.Srinivasan: Web Technology Theory and Practice, Pearson Education, 2012.   5. Jeffrey.C.Jackson: Web Technologies-A Computer Science Perspective, Pearson Education, Eleventh Impression, 2012

Micro Projects to be carried out on advanced topics like HTML5, CSS3 and PHP with my SQL .

Subject Title	:	Software Engineering
Subject code	:	UIS510C
Semester	:	5
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 the basic concepts of software engineering.
2. Compare various software development life cycle models and apply appropriate model for a real time complex software development problem.
3. Elicitate, analyse and document in a standard form the requirements of real time complex software.
4. Apply various methods of software designs, user interface designs and coding standards to produce a software design document for real time complex software.
5. Design and write test cases using various test generation methods (Black box and White box methods) to test and produce reliable software.
6. Estimate the cost and resources required to develop real time complex software using various costing and project management methods.

UNIT - I	10 Hours	Teaching Hours	Tutorial 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).		**10**	**00**

UNIT - II	10 Hours	Teaching Hours	Tutorial 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 Modelling 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		**10**	**00**

UNIT - III	10 Hours	Teaching Hours	Tutorial Hours

		Teaching Hours	Tutorial 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**	**00**
UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial 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**	**00**

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	:	Database Management Systems
Subject code	:	UIS503C
Semester	:	5
Credits with LTP Structure	:	4 Credits (3L-1T-0P)
Lecture Hours per Week	:	3 Hours
Tutorial Hours per Week	:	2 Hours
Total Contact Hours	:	66 (40 Teaching Hours + 26 Tutorial Hours)

Course Outcomes:

After completing the course the student will be able to:

1. Comprehend fundamentals of database management systems.
2. Design an ER model to open-ended database problem.
3. Develop a relational database model from ER model.
4. Design normalized relations.
5. Write SQL queries to create ,access, modify/update the databases.
6. Comprehend basics of transaction processing concepts and various concurrency techniques.

UNIT - I	16 Hours	Teaching Hours	Tutorial Hours
INTRODUCTION: Introduction; An example; Characteristics of database approach; Advantages of using DBMS approach; when not to use a DBMS. 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.		10	6

UNIT - II	16 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. **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. **PL/SQL:** PL/SQL Concepts, PL/SQL Language Fundamentals, SQL in PL/SQL, DML Statements in PL/SQL		10	6

UNIT - III		17 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; Multivalued dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal forms.			10	7
UNIT - IV		17 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;			10	7

Text Books:

1. "Fundamentals of Database Systems", Remez Elmasri & Shamkant B.
Navathe, 5 th Edition, Pearson Education;

Reference Books:

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

Subject Title	:	Theoretical foundations of computer science
Subject code	:	UIS514C
Semester	:	5
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. Demonstrate a fundamental knowledge of the core concepts in automata theory an dformal 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

Subject Title	:	**Advanced Quantitative Aptitude and Soft Skills**
Subject code	:	**UHS002N**
Semester	:	**5**
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:

5. Learnt the role of verbal and non-verbal communication and enhanced his/her ability to speak in public or to an audience.

6. Learned the techniques to augment his/her verbal ability.

7. Enhanced his/her written communication and learnt techniques to augment them further.

8. Understood analysis of the given problem and learnt to develop a method for solving it.

9. Enhanced and augmented his/her ability to work with quantitative aptitude.

UNIT - I	04 Hours	Teaching Hours	Tutorial Hours
Mathematical Ability: Averages, Percentages, Profit Loss, Interest, Time & Work		**04**	**00**

UNIT - II	04 Hours	Teaching Hours	Tutorial Hours
Analytical Ability: Analytical Puzzles, Data Analysis, Para-jumbles and miscellaneous questions		**04**	**00**

UNIT - III	04 Hours	Teaching Hours	Tutorial Hours
Group Discussions & Written Communication: Zero GD, Parameters of Evaluation, Introduction and Conclusion, Mock GDs, Introduction to Business Communication		**04**	**00**

UNIT - IV	03 Hours	Teaching Hours	Tutorial Hours
Written English: Error Detection & Correction, Letter/Email Writing		**03**	**00**

Text Books:

1. Innovations Unlimited Training Services, "Number Math Book 2", Padmashree Printers

2. Innovations Unlimited Training Services, "Logical Ability Book 2", Padmashree Printers

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. Edward De Bono, "Lateral Thinking", Penguin Books, New Delhi, 2016

Subject Title	:	**Software Testing**
Subject code	:	**UIS607C**
Semester	:	**5**
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. Identify errors, faults, failures, test process, correctness, reliability, oracles.
2. Comprehend the various testing models, defect management, quality attributes and test generation strategies.
3. To generate requirement based test cases (black box testing) and structural testing (white box testing).
4. Design the test cases to check data flow for the given program.
5. Develop test cases by using various adequacy criteria.
6. Apply various testing process to test a given small application.

UNIT - I	10 Hours	Teaching Hours	Tutorial Hours
BASICS OF SOFTWARE TESTING: Human Errors and Testing; Software Quality; Requirements, Behavior and Correctness; Correctness versus Reliability; Testing and Debugging; Test Metrics. Testing and Verification; Defect Management; Execution History;Test-generation Strategies, Static Testing. Types of Testing.		10	00

UNIT - II	10 Hours	Teaching Hours	Tutorial Hours
TEST GENERATION FROM REQUIREMENTS: Introduction; The Test-Selection Problem; Equivalence Partitioning; Boundary Value Analysis; Category-Partition Method. Cause-Effect Graphing.		10	00

UNIT - III	10 Hours	Teaching Hours	Tutorial Hours
STRUCTURAL TESTING: Overview; Statement testing; Branch testing; Condition testing, Path testing; Procedure call testing; Comparing structural testing criteria; The infeasibility problem. **DEPENDENCE, DATA FLOW MODELS, AND DATA FLOW TESTING:** Definition-Use pairs; Data flow analysis; Classic analyses; From execution to conservative flow analysis; Data flow analysis with arrays and pointers; Inter-		10	00

procedural analysis; Overview of data flow testing; Definition-Use associations; Data flow testing criteria; Data flow coverage with complex structures; The infeasibility problem.			
UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
TEST CASE SELECTION AND ADEQUACY: Overview; Test specification and cases; Adequacy criteria; Comparing criteria; **PROCESS:** Integration and component-based software testing: Overview; Integration testing strategies; Testing components and assemblies. System, Acceptance and Regression Testing: Overview; System testing; Acceptance testing; Usability; Regression testing; Regression test selection techniques; Test case prioritization and selective execution.		**10**	**00**

Text Books:

1. **Foundations of Software Testing** Aditya P Mathur, Pearson Education, 2008. (chapter 1, 2)

2. **Software Testing and Analysis Process Principles and Techniques** Mauro Pezze, Michal Young, Wiley India,
   2008. (chapter 6,9,12,13,20,21,22)

Reference Books:

1. **Software Testing Principles and Practices** Srinivasan Desikan, Gopalaswamy Ramesh, 2ndEdition, Pearson, 2007.

2. **Software Testing** Ron Patton, 2nd edition, Pearson, 2004.

3. **The Craft of Software Testing** Brian Marrick, Pearson, 1995.

Subject Title	:	Computer Networks
Subject code	:	UIS623C
Semester	:	6
Credits with LTP Structure	:	4 Credits (3L-1T-0P)
Lecture Hours per Week	:	3 Hours
Tutorial Hours per Week	:	2 Hours
Total Contact Hours	:	40 (40 Teaching Hours + 26 Tutorial Hours)

Course Outcomes:

After completing the course the student will be able to:

1. To comprehend basics of data communication system.
2. Enumerate the layers of the OSI, TCP/IP model and demonstrate functions of each layer and comprehend the concept of data link protocols.
3. To exhibit the ability to apply different error detection and correction technique to solve communication problem.
4. Demonstrate the ability to apply the concept of classfull and classless addressing with their respective address space in various networks.
5. Demonstrate the concept of internetworking, routing techniques of network layer.
6. Exhibit the ability to demonstrate the features and operations of various transport and application layer protocol such as TCP, UDP, DNS, and TELNET

UNIT - I	16 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], Protocols: 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: 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	06

UNIT - II	16 Hours	Teaching Hours	Tutorial Hours
Switching: Definition, Circuit switched networks, Data gram Networks, Virtual circuit networks.		10	06

Data Link Layer: Error detection and correction: Cyclic codes: Checksum. **Data link control**: Protocols: Noiseless channels: Noisy channels.			
UNIT - III	**17 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**	**07**
UNIT - IV	**17 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:** Domain Name System: Name Space, Domain Name Space, DNS In The Internet, Resolution. **Remote Logging, Electronic Mail and File Transfer:** Remote logging: Telnet, Electronic mail: Architecture ,File Transfer: FTP		**10**	**07**

Text Books:

1. 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 Indra Widjaja, 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	:	**Career Planning and Professional Skills**
Subject code	:	**UHS003N**
Semester	:	**6**
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. Learnt to handle personal interviews successfully.
2. Enhanced the usage and understanding of the various structures in the English Language.
3. Augmented his/her leadership and team workmanship skills.
4. Understood analysis of the given problem and learnt to develop a method for solving it.
5. Enhanced and augmented his/her ability to work with quantitative problems.

UNIT - I	04 Hours	Teaching Hours	Tutorial Hours
Reasoning Ability: Boolean Logic, Cryptarithms, Critical Reasoning, Verbal and Non-Verbal Reasoning		**04**	**00**

UNIT - II	04 Hours	Teaching Hours	Tutorial Hours
Written & Spoken English: Reading Comprehension, Sentence Completion, Recap of sounds and stress, Pausing and Rhythm		**03**	**00**

UNIT - III	04 Hours	Teaching Hours	Tutorial Hours
Hrs. Mathematical Thinking: Taking time to Work with Distances, Permutations, Probability, Data Sufficiency		**04**	**00**

UNIT - IV	03 Hours	Teaching Hours	Tutorial Hours
Hrs. Interview Skills: Mock GDs, Résumé Writing, FAQs in HR Interviews, Interview Etiquette, Team & Leadership Skills		**04**	**00**

Text Books:
1. Innovations Unlimited Training Services, "Number Math Book 3", Padmashree Printers

2. Innovations Unlimited Training Services, "Logical Ability Book 1", Padmashree Printers

3. Innovations Unlimited Training Services, "Grammar & Comprehension Book 3", Padmashree Printers

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. Edward De Bono, "Lateral Thinking", Penguin Books, New Delhi, 2016

Subject Title	:	**Object Oriented Modeling and Design**
Subject code	:	**UIS720C**
Semester	:	**7**
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. Apply the Object Oriented approaches for modeling and design.
2. Analyze the structural and behavioral models using UML appropriate notations.
3. Design object oriented models for development of software applications.
4. Design suitable implementation methods for object oriented models.

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; 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.		**10**	**00**

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:

1. 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	:	UIS718C
Semester	:	7
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. Analyze the success of a software project in a real world environment.
2. Evaluate appropriateness of projects against Strategic, Technical, and Economic criteria.
3. Identify the risk factors and their effects in a software projects.
4. Design various charts and reports for visualizing project progress status.
5. Use the right human resources and their role in the software project management.

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, Methods, and Methodologies, Stakeholders, Setting objectives, Management Control, Overview of Project Planning – Stepwise Project Planning.		10	00

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	00

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,		10	00

		Teaching Hours	Tutorial Hours
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.			
UNIT - IV	**10 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**	**00**

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

Professional Electives

Subject Title	:	**Data Science using Python**
Subject code	:	**UIS047E**
Semester	:	**5**
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 fundamental concepts of data science along with its relation with other disciplines and skills needed for it.

2. Apply computational thinking and data pre-processing techniques of data analysis.

3. Use data analytical techniques and tools necessary to generate useful information from datasets.

4. Solve linear regression problems using linear modelling and gradient descent approaches.

5. Apply supervised machine learning methods for classification and unsupervised machine learning methods for clustering.

6. Apply data collection and evaluation skills in data science and machine learning.

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, Issues of Ethics, Bias, and Privacy in 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		**10**	**00**

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,			
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, SurveyServices, Analyzing Survey Data , Pros and Cons of Surveys, Interviews and Focus Groups, Why Doan 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 toQualitative Methods , Mixed Method Studies, Evaluation: Comparing Models, Cross-Validation.		**10**	**00**

Text Books:

1. A hands-on introduction to Data Science, Chirag Shah, Cambridge University Press, 2020.
   Unit1: Chapter 1, 2
   Unit 2: Chapter 3, 5.1,5.2,5.3,5.4,5.5
   Unit 3: Chapter 8, 9.1,9.2,9.4,9.7,5.6.1,5.6.2
   Unit 4: Chapter 10.2,10.5,5.6.3, 12

Reference Books:

1. Data Science from Scratch, Joel Grus, O'Rielly Publications, 2015.
2. 2) Introduction to Data Science, Laura Igual and Santi Segui, Springer International Publications, 2017.

Subject Title	:	Advanced Java Programming
Subject code	:	UIS048E
Semester	:	6
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. Build Java applets for solving given problems.
2. Use Java applets for event handling.
3. Implement J2EE applications using Java servlets.
4. Apply the concept of database connectivity using java applications.
5. Deploy enterprise web applications using JSP.

UNIT - I	10 Hours	Teaching Hours	Tutorial Hours
Applets and Event Handling **The Applet Class:** Two types of Applets, Applet basics, Applet Architecture, An Applet skeleton, Simple Applet display methods, Requesting repainting, The HTML'APPLET' tag, Passing parameters to Applets. **Event Handling:** Two Event Handling Mechanisms, The Delegation Event Model, Event Classes, Sources of Events, Event Listener Interfaces, Using the Delegation Event Model		10	00
UNIT - II	10 Hours	Teaching Hours	Tutorial Hours
Java2 Enterprise Edition and Servlets **Java2 Enterprise Edition(J2EE) Overview:** J2EE and J2SE, The Birth of J2EE, Databases, The maturing of Java, Java beans and java message service, need for J2EE. **Multi-Tier architecture**: Distributive Systems, The tier, J2EE multitier architecture. **Servlets**: Java Servlets and Common Gateway Interface Programming, A Simple Java Servlet. Anatomy of a Java Servlet, Reading data from a client, Reading HTTP request headers, Sending data to a client and Writing the HTTP response header, Working with Cookies, Tracking Sessions.		10	00
UNIT - III	10 Hours	Teaching Hours	Tutorial Hours

		Teaching Hours	Tutorial Hours
JDBC and Embedded SQL **JDBC Objects:** The concepts of JDBC, JDBC Drivers Types, JDBC Packages, A brief overview of the JDBC Process, Database connection, Statement Objects, ResultSet, Transaction Processing, Metadata, Data Types, Exceptions **JDBC and Embedded SQL**: Model programs, Tables, Inserting data into tables, Selecting data from a table, Updating tables, Deleting data from a table.		**10**	**00**
UNIT - IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Java Server Pages (JSP) **JSP Syntax and semantics**: JSP Overview, The JSP Development model, Components of JSP Page, A complete example, Expressions, Scriptlets and Declarations: Expressions, Scriptlets, and Declarations. **Request dispatching:** Anatomy of request processing, Including other resources, The include directive, The <jsp:include> action, Method to be used, Forwarding requests.		**10**	**00**

Text Books:

1. The Complete Reference -Java, Herbert Schildt, 7th edition, McGraw Hill Publication.(Chapters 21,22)

2. The Complete Reference –J2EE, Jim Keogh, McGraw Hill Publication.(Chapters 1, 2, 6, 7, 10)

3. The Complete Reference –JSP 2.0, Phil Hanna, McGraw Hill Publication.(Chapters 4, 5, 6, 7)

Reference Books:

1. Java 6 Programming Black Book, Dreamtech Press. 2007.

2. Core servlets and Java Server Pages, Marty Hall, Larry Brown, Volume 1: Core Technologies, Second Edition.

Subject Title	:	Advanced Algorithm
Subject Code	:	**UIS042E**
Semester	:	**6**
Credits with LTP Structure	:	**3 Credits (3L-0T-0P)**
Lecture Hours per Week	:	**3 Hours**
Tutorial Hours per Week	:	**00**
Total Contact Hours	:	**40 (40 Teaching Hours + 00 Tutorial Hours)**

Course Outcomes:

After completing the course the student will be able to:

1. Apply algorithms of searching, traversing of graphs and finding shortest path in graphs to solve problems by identifying them.
2. Use algorithms of balanced search tree to perform insertion, deletion, and rotation operations on it.
3. Select appropriate string-matching algorithm to solve problems.
4. Implement parallel sorting algorithms.

Unit –I	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
GRAPH ALGORITHMS: Search and Traversal of Graphs-DFS, DFS Tree, Depth first traversal, BFS, BFS Tree and Shortest Paths, Search Engine and Traversing Digraphs: Topological sorting, Shortest Paths and Diagraphs : Bellman-Ford algorithm		**10**	**00**
Unit –II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Balanced Search Trees Algorithms: The Dictionary Problem, Rotations in Binary Search Trees, Red-Block Trees: Definition and Depth of Red Black Trees, inserting node into Red Black Tree, Deleting node from Red Black Tree, B-Trees : Definition and properties of B-Trees , Searching a B-Tree, inserting a key into B-Tree, Deleting a key from B-tree		**10**	**00**
Unit -III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
String Matching and Document Processing: The Naïve Algorithm, The Knuth-Morris-Pratt Algorithm, The Boyer-Moore String-Matching Algorithm, The Karp-Rabin String-Matching Algorithm, Approximate String Matching, Tries and Suffix Trees: Standard Tries, Compressed Tries, Suffix Tries,		**10**	**00**
Unit-IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Introduction to parallel Algorithms and Architectures: Approaches to the		**10**	**00**

Design of Parallel Algorithms, Architectural Constraints and the Design of Parallel Algorithms: Single instruction vs Multiple instructions, the number and type of processors available, shared memory: PRAMS, example: Searching on a PRAM, distributed memory; interconnection networks, three basic goodness majors for inter connections networks, example; searching on meshes, I/O Constraints Performance Measures of Parallel Algorithms; speedup and AMDAHL'S Law, Parallel Sorting: sorting on the CRCW and CREW PRAMS, Even-odd merge sort on the EREW PRAM, the 0/1 sorting lemma, sorting on the one dimensional mesh, sorting on the two dimensional mesh,

Text Books:

1. "Algorithms" by Kenneth A Berman and Jerome L Paul, CENEAGE LEARNING INDIA PVT LTD (2010) India Edition 2008

Reference Books:

1. "Introduction to Algorithms" by Thomas H Cormen, CharllesLeiserson etall,PHI Third Edition.
2. "Algorithms"by Robert Sedgewick , Kevin Wayne Addison-Wesley Professional; 4th edition.

Subject Title	:	**Big Data and Analytics**
Subject Code	:	**UIS038E**
Semester	:	**7**
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. Analyze the characteristics of digital data and it's challenges in Big data environment.
2. Analyze the challenges of big data analytics and its terminalogies that prevent businesses from capitalizing.
3. Build meaningful conversations on Big Data and analytics using Hadoop.
4. Identify suitable types of NoSQL databases to solve complex engineering problems.
5. Apply Hive and Pig tools on structured data for processinng and analyzing.

UNIT –I	10 Hours	Teaching Hours	Tutorial Hours
Types of Digital Data: Classification of Digital Data – Structured Data, Semi-Structured Data, and Unstructured Data. **Introduction to Big Data:** Characteristics of Data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, What is Big Data? Other Characteristics of Data Which are not Definitional Traits of Big Data, Why Big Data? Are We Just an Information Consumer or Do we also Produce Information? Traditional Business Intelligence (BI) versus Big Data, A Typical Data Warehouse Environment, A Typical Hadoop Environment, What is New Today? What is changing in the Realms of Big Data? **Big Data Analytics:** Where do we Begin? What is Big Data Analytics? What Big Data Analytics Isn't? Why this Sudden Hype Around Big Data Analytics? Classification of Analytics, Greatest Challenges that Prevent Businesses from Capitalizing on Big Data, Top Challenges Facing Big Data, Why is Big Data Analytics Important? What Kind of Technologies are we looking Toward to Help Meet the Challenges Posed by Big Data? Data Science, Data Scientist. Terminologies Used in Big Data Environments, Basically Available Soft State		**10**	**00**

Eventual Consistency (BASE), Few Top Analytics Tools.			
UNIT –II	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Big Data Technology Landscape - NoSQL (Not Only SQL) and Hadoop. **NoSQL (Not Only SQL)** - Where is it used? What is it?, Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, What we miss with NoSQL?, NoSQL Vendors, SQL Versus NoSQL, NewSQL, Comparison of SQL, NoSQL, and NewSQL. **Hadoop:** Features of Hadoop, Key advantages of Hadoop, Versions of Hadoop - Hadoop 1.0, Hadoop 2.0, Overview of Hadoop Ecosystems, Hadoop Versus, SQL, Integrated Hadoop systems offered by leading market vendors, Cloud based Hadoop solutions. Introducing Hadoop, Why Hadoop? Why not RDBMS?, RDBMS versus Hadoop, Distributed Computing Challenges, History of Hadoop, Hadoop Overview, Use Case of Hadoop, Hadoop Distributors, HDFS (Hadoop Distributed File System), Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator), Interacting with Hadoop Ecosystem.		**10**	**00**
UNIT -III	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Introduction to MongoDB: What is MongoDB? Why MongoDB?, Terms Used in RDBMS and MongoDB, Data Types in MongoDB, MongoDB Query Language.- Insert, Save, Update, Remove, find methods, Dealing with NULL values, Count, Limit, Sort and Skip Methods **Introduction to Cassandra:** An Introduction, Features of Cassandra, CQL Data types, CQLSH, Keyspaces, CRUD (Create, Read, Update and Delete) Operations, Collections..		**10**	**00**
UNIT-IV	**10 Hours**	**Teaching Hours**	**Tutorial Hours**
Hive: What is Hive?, Hive Architecture, Hive Data Types, Hive File Formats, Hive Query Language (HQL), RCFile Implementation, SerDe, User-defined Function (UDF). **Introduction to Pig:** What is Pig?, The Anatomy of Pig, Pig on Hadoop, Pig Philosophy, Use Case for Pig: ETL Processing, Pig Latin Overview, Data Types in Pig, Running Pig, Execution Modes of Pig, Relational Operators, Eval Function, Complex Data Types.		**10**	**00**

Text Book(s):

1. Seema. Acharya and Subhashini. C, "Big Data and Analytics", 1st Edition, Wiley India, 2015 (Chapters 1,2,3,4,5,6,7,9,10).

Reference Books:

1. Bart. Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", 1st Edition, Wiley, 2014.
2. DT Editorial Services, "Big Data: Black Book, Comprehensive Problem Solver", 1st Edition, Dreamtech Press, 2016.
3. Tom. White, "Hadoop – The Definitive Guide", 3rd Edition, O'Reilly, 2012.
4. Alex Holmes, "Hadoop in Practice", 2nd Edition, Dreamtech Press India Pvt. Ltd, 2014.
5. Dayong. Du, "Apache Hive Essentials", 2nd Edition, Packt Publishing Limited, 2018.
6. Alan. Gates, "Programming Pig", 2nd Edition, Shroff/O'Reilly, 2016.
7. Alan. Gates, "Programming Pig: Dataflow Scripting with Hadoop", 2nd Edition, Shroff/O'Reilly, 2016.

Subject Title	:	Internet of Things
Subject Code	:	UIS045E
Semester	:	7
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 the fundamentals of IoT.
2. Identify the challenges driving the architectures of IoT systems.
3. Identify design limitations and the role of IoT networks.
4. Analyze the data generated with IoT devices.
5. Use appropriate physical IoT devices to implement an application.
6. Design solutions to open ended problems using IoT.

UNIT –I	10 Hours	Teaching Hours	Tutorial Hours
Introduction to IoT: What is IoT? Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoTNetwork Architecture and Design: Drivers Behind New Network Architectures, Comparing IoTArchitectures, ASimplifiedIoTArchitecture,TheCoreIoTFunctionalStack,IoT Data Management and Compute Stack.		10	00

UNIT –II	10 Hours	Teaching Hours	Tutorial Hours
Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks,Connecting Smart Objects: Communications Criteria, IoT Access Technologies: Salient features ofprotocolstacksutilizingIEEE 802.15.4(Intd.): Zigbee Protocol, LoRaWAN		10	00

UNIT -III	10 Hours	Teaching Hours	Tutorial 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	00

UNIT-IV	10 Hours	Teaching	Tutorial

		Hours	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: OCTAVEandFAIR, 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**	**00**

Text Book(s):

1) DavidHanes,GonzaloSalgueiro,PatrickGrossetete,RobertBarton,JeromeHenry,"IoTFundamentals:Networking Technologies, Protocols, and Use Cases for the Internet of Things", Edition, Pearson Education(CiscoPressIndian Reprint). (ISBN:978- 9386873743)
2) SrinivasaKG,"InternetofThings",CENGAGELeaningIndia,2017

Reference Books:

1. VijayMadisettiandArshdeepBahga,"InternetofThings(AHands-on- Approach)", 1st Edition, VPT, 2014. (ISBN:978-8173719547)
2. RajKamal,"InternetofThings:ArchitectureandDesignPrinciples",1stEdition,McGrawHillEducation,2017.(ISBN:978-9352605224)

Subject Title	:	**Distributed and Cloud Computing**
Subject Code	:	**UIS033E**
Semester	:	**8**
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 the various types of distributed system models and enabling technologies.
2. Analyze the assessment of clusters for scalable parallel computing.
3. Analyze design principles, architectures, and various platforms of cloud computing.
4. Use various features and programming paradigms to build real time applications.
5. Analyze various programming supports and emerging cloud softwares in cloud environments.

UNIT –I	10 Hours	Teaching Hours	Tutorial Hours
Distributed System Models and Enabling Technologies: Scalable computing over the Internet, System Models for Distributed and Cloud Computing - *Clusters of Cooperative Computers*, *Grid Computing Infrastructures, Peer-to-Peer Network Families, Cloud Computing over the Internet.* Software Environments for Distributed Systems and Clouds - *Parallel and Distributed Programming Models*. **Computer Clusters for Scalable Parallel Computing:** Clustering for massive parallelism – *Cluster development trends, Design objectives of computer clusters, and fundamental cluster design issues*. Computer Clusters and MPP Architectures – *Cluster organization and Resource Sharing Node Architecture and MPP packaging.* Design Principles of Computer Clusters– *Single System Image Features.*		**10**	**00**

UNIT –II	10 Hours	Teaching Hours	Tutorial Hours
Cloud Platform Architecture over Virtualized Data Centers: Cloud Computing and Service Models. Data Center Design and Interconnection Network, Architecture Design of Compute and Storage Clouds – *A Generic Cloud Architecture Design, Layered Cloud Architectural Development – Market Oriented Cloud Architecture.* Architectural design Challenges. Public Cloud Platforms – GAE, AWS and AZURE.		**10**	**00**

UNIT -III	10 Hours	Teaching Hours	Tutorial Hours
Cloud Security and Trust Management – *Cloud Security Defense Strategies, Distributed Intrusion/Anomaly Detection, Data and Software Protection Techniques*. Cloud Programming and Software Environments – *Features of Cloud and Grid Platforms, Parallel and Distributed Programming Paradigms – Parallel Computing and Programming Paradigms, MapReduce, Twister, and Iterative MapReduce, and Hadoop Library from Apache*.		**10**	**00**

UNIT-IV	10 Hours	Teaching Hours	Tutorial Hours
Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software environments, Enabling Technologies for the Internet of Things – The Internet of Things for Ubiquitous Computing.		**10**	**00**

Text Book(s):
1. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Distributed & Cloud Computing, Morgan Kaufmann Publishers, Elsevier, 2012

Reference Books:
1. Dinakar Sitaram, Geeta Manjunath, Moving to the cloud, Elsevier, 2012

Subject Title	:	Data Mining
Subject Code	:	UIS019E
Semester	:	8
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 the fundamentals of Data mining.
2. Apply data preprocessing techniques
3. Apply association rule mining techniques like apriory, FP tree and ECLAT and anlyse the usefulness of rules
4. Apply classification method like decision tree, rule based and nearest neighbour.
5. Demonstrate cluster analysis techniques (K means, DBSCAN) to cluster problems.
6. Comprehend advanced mining applications and algoriths like web mining, search engines etc.,

UNIT –I	10 Hours	Teaching Hours	Tutorial Hours
Introduction to data mining: Definition of Data Mining, Motivating Challenges of DM, Data Mining Tasks. Data: Data Attributes, Types of Data, Quality of Data and Data Preprocessing, Measures of Similarity and Dissimilarity.		10	00

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. Alternate Method of Generating Item Sets, FP Growth Algorithms, Evaluation of Association Patterns		10	00

UNIT -III	10 Hours	Teaching Hours	Tutorial Hours
Classification: Preliminaries, General Approach To Solving Classification Problem, Decision Tree Based Classifier, Rule Based Classifier, Nearest Neighbor Classifier. Cluster Analysis: Overview, K-means, DBSCAN		10	00

UNIT-IV	10 Hours	Teaching Hours	Tutorial Hours
Applications: Data Mining Applications, Web Mining, Search Engines		10	00

Text Book(s):

1. "Introduction to Data Mining", Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education. (Chapter 1, 2, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 6.2, 6.3, 6.4, 6.5, 6.7, 6.8, 8.1, 8.2, 8.4)
2. "Data Mining – Concepts and Techniques", Jiawei Han and Micheline Kamber, Morgan Kaufman, 2006, 2nd Edition. (Chapter 10)
3. "Introduction to Data Mining with Case Studies", G K Gupta, PHI. (Chapter 5, 6)

Reference Books:

Subject Title	:	NOSQL
Subject Code	:	UIS039E
Semester	:	8
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. Explain and compare different types of NoSQL Databases.
2. Compare and contrast RDBMS with different NoSQL databases.
3. Demonstrate the detailed architecture and performance tune of Document-oriented NoSQL databases.
4. Explain performance tune of Key-Value Pair NoSQL Databases.
5. Apply NoSQL development tools on different types of NoSQL Databases.

UNIT –I	10 Hours	Teaching Hours	Tutorial Hours
What is NoSQL? Where is it used? What is it? Features of NoSQL. Types of NoSQL Databases. Why NoSQL? Advantages of NoSQL. The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedence Mismatch, Application and Integration Databases, Attack of the Cluster, The Emergence of NoSQL, Comparison of relational databases to NoSQL , Application, RDBMS approach, Challenges.		10	00

UNIT –II	10 Hours	Teaching Hours	Tutorial Hours
NoSQL key/value databases using MongoDB, Document Databases, Document oriented Database features, Consistency, Transactions, Avalability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, Complex Transactions Spanning Different Operations, Queries against varying Aggregate structure. MongoDB Query Language		10	00

UNIT -III	10 Hours	Teaching Hours	Tutorial Hours
Column-oriented NoSQL databases using Apache Cassandra, Column-Family Data store features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage. Cassaandra Query Language Graph Databases. What is Graph Database. Features. Consistency, Transactions, Availability, Query Featur Dataes, Scaling. Suitable Use Cases.		10	00

UNIT-IV	10 Hours	Teaching Hours	Tutorial Hours
Schema Migrations: Schema Changes, Schema Changes in RDMBS, Schema changes in a NoSQL Datastore, Polyglot Perstenence, Beyond NoSQL, Choosing Your Database		10	00

Text Book(s):

1. Sadalage.P & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persitence, Wiley Publications, 1st Edition, 2019
2. Getting Started with NoSQL: Your Guide to the world and Technology of NoSQL- Gaurav Vaish, Packt Publishing

Reference Books:

1. Seema Acharya and Subhashini Chellappan – Big Data and Analytics, Wiley India Pvt Ltd
2. Dan Sullivan, "NoSQL For Mere Mortals", 1st Edition, Pearson Education India, 2015. (ISBN-13:978-9332557338)
3. Dan McCreary and Ann Kelly, "Making Sense of NoSQL: A Guide for Managers and the Rest of us", 1st Edition, Manning Publication/Dreamtech Press 2013. (ISBN-13:978-9351192022)
4. https://www.geeksforgeeks.org/introdution-to-nosql
5. https://www.javapoint.com/nosql-databa

Open Electives

Subject Title	:	Software Engineering
Subject code	:	UIS531N
Semester	:	5
Credits with LTP Structure	:	3 Credits (3L-0P-0T)
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 fundamental of Software Engineering.
2. Compare software development life cycle models and apply appropriate model to a small commercial project.
3. Elicitate, analyse, specify and document requirements using various methods.
4. Apply various project management techniques to estimate and staff for small project.
5. Design small software using various architectural and design models.
6. Develop peusdocode, algorithms, and test cases to verify and validate software.

UNIT - I	10 Hours	Teaching Hours	Tutorial Hours
Introduction to Software Engineering. **The Software Process:** Various Software Process models, their comparison, advantages and disadvantages.		10	0

UNIT - II	10 Hours	Teaching Hours	Tutorial Hours
Software Requirements Analysis and Specification: Format of SRS, Characteristics of SRS, Functional and Non Functional requirements, Requirements analysis using Data Flow and ER Diagrams. **Project Management:** Planning, effort estimation, scheduling and staffing.		10	0

UNIT - III	10 Hours	Teaching Hours	Tutorial Hours
Software Architecture: Various architectural views and styles, documenting architecture. **Software Design:** Design concepts, Coupling and Cohesion, Function and Object Oriented Design, various complexity metrics.		10	0

UNIT - IV	10 Hours	Teaching Hours	Tutorial Hours
Coding: Principles and guidelines of coding, incremental and evolving style of coding, Unit Testing, code inspection and review, metrics. **Testing:** Concepts, test plan, test cases design using Black Box and White Box methods, metrics.		10	0

Text Books:

1. Pankaj Jalote, A concise Introduction to Software Engineering, Springer-Verlog, 2008

Reference Books:

1. Roger Pressman, A practitioners Approach to Software Engneering, PHI.
2. Ian Somerville, Fundamentals of Software Engineering, Pearson Education, 10 ed.
3. Rajib Mall, Fundamentals of Software Engineering, PHI, 2009.

Subject Title	:	Java Programming
Subject Code	:	UIS532N
Semester	:	6
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:

6. Identify the fundamental features and applications of object oriented concepts.
7. Create the programs using basics of Java programming language.
8. Develop programs applying the concepts of classes and objects, constructors, method overloading.
9. Develop programs applying the concept of inheritance to develop programs.
10. Identify the fundamental concepts and applications of multithreading.

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. **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.		**10**	**00**

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(s):

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   Education.

Subject Title	:	Database Management
Subject Code	:	UIS002N
Semester	:	6
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 the fundamentals of DBMS concepts, its applications etc.
2. Identify entities, attributes, relationships between entities, their type etc., and draw the ER diagram for a given small problem.
3. Normalise the relations up to 3NF/BCNF and Design a relational schema.
4. Use SQL commands and constructs to create, update and retrieve data from tables.
5. Understand the concepts of transaction processing.
6. Learn various recovery algorithms.

Unit –I	10 Hours	Teaching Hours	Tutorial Hours
INTRODUCTION: Characteristicsofdatabaseapproach;AdvantagesofusingDBMSapproach; Usage of DBMS. Data models, schemas and instances; Three-schema architectureanddataindependence;Databaselanguagesandinterfaces;Thedatabasesystemenvironment;Centralizedandclient-serverarchitectures;ClassificationofDatabaseManagementsystems. **ENTITY-RELATIONSHIP MODEL**: Using High-Level Conceptual Data Models for DatabaseDesign;Anexample databaseapplication;Entity types,Entitysets,AttributesandKeys;Relationshiptypes, Relationship sets, RolesandStructural constraints; Weakentitytypes;Refining the ER Design; ER Diagrams, Naming conventions and design issues.		10	00

Unit –II	10 Hours	Teaching Hours	Tutorial Hours
RELATIONALMODEL AND RELATIONAL DATABASE CONSTRAINTS: Relational model concepts; Relational modelconstraints and Relational database schemas; Update operations, Transaction and dealing with constraint violations. **DATABASEDESIGN**:Informaldesignguidelinesforrelationschemas;Functionaldependencies; Normal forms based on primary keys; General definitions of second and thirdnormalforms; Boyce-CoddNormalForm.		10	00

Unit -III	10 Hours	Teaching Hours	Tutorial Hours
SQL: data definition and data types; Specifying basic constraints in SQL; Schema changestatements in SQL; Basic queries in SQL; More complex SQL queries. Insert, Delete and Update statements in SQL; Specifying constraintsas Assertion and Trigger; Views(Virtual Tables) inSQL;		10	00

Unit-IV	10 Hours	Teaching Hours	Tutorial Hours
TRANSACTION MANAGEMENT: Introduction to transaction processing; Transaction &system concepts; Desirable properties of transactions; Characterizing schedules based onrecoverability; Characterizing schedules based on serializability; Transaction support in SQL; Transaction Controlin SQL. **RECOVERY ALGORITHMS:**		10	00

Text Book(s):

1. FundamentalsofDatabaseSystems",RemezElmasri&ShamkantB.Navathe,5thEdition,Pearson Education

Reference Books:

1. DatabaseManagementSystems", RamakrishananGehrke3rdedition, McGraw-HillHigherEducation;
2. "AnIntroductiontoDatabase systems", C. J.Date, AddisonWesley, 4thedition.

Subject Title	:	Data Mining
Subject code	:	UIS0731N
Semester	:	7
Credits with LTP Structure	:	3 Credits (4L-0P-0T)
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. Display a comprehensive understanding of Data mining, its role and importance in present scenario.
2. 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.
3. Discover useful and interesting associations between various types of items in transactional data using association mining algorithms.
4. Apply classification algorithms to real time data.
5. Find and evaluate clusters in given real time data and find useful patterns.
6. 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. (Chapter 1,2,3,4,5, 6)
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.