SETHU INSTITUTE OF TECHNOLOGY

Estd. 1995

Pulloor, Kariapatti – 626 115

B.E. Degree Programme

CBCS CURRICULUM

Regulations 2019

Bachelor of Engineering in Computer Science & Engineering

OVERALL COURSE STRUCTURE

Category	Total No. of Courses	Credits	Percentage
Humanities & Social Sciences	**6**	**12.5**	**7.14**
Basic Sciences	**10**	**28.5**	**16.29**
Engineering Sciences	**11**	**28**	**16**
Professional Core	**23**	**61**	**34.85**
Professional Elective	**6**	**18**	**10.29**
Open Electives	**4**	**12**	**6.86**
Project Work	**5**	**15**	**8.57**
Mandatory Course	**5**	**-**	**-**
TOTAL	**70**	**175**	**100**

COURSE CREDITS – SEMESTER WISE

Branch	I	II	III	IV	V	VI	VII	VIII	TOTAL
CSE	**23**	**20.5**	**24.5**	**21.5**	**23.5**	**26**	**22**	**14**	**175**

Semester I

Course Code		Course Title	L	T	P	C
THEORY						
19UGM131	MC	Induction Programme				
19UEN101	HS	English for Technical Communication	2	0	0	2
19UMA102	BS	Engineering Mathematics-I	3	1	0	4
19UPH103	BS	Engineering Physics	3	0	0	3
19UCY105	BS	Applied Chemistry	3	0	0	3
19UCS108	ES	Problem Solving and PYTHON programming	3	0	0	3
19UME109	ES	Engineering Graphics	3	1	0	4
PRACTICAL						
19UCS110	ES	Problem Solving and PYTHON programming Laboratory	0	0	3	1.5
19UCS112	ES	Engineering Fundamentals Laboratory	0	0	3	1.5
19UGS113	BS	Basic Sciences Laboratory	0	0	2	1
		TOTAL	**17**	**2**	**8**	**23**
Total No. of Credits – 23						

Semester II

Course Code		Course Title	L	T	P	C
THEORY						
19UEN201	HS	Communication Skills for Professionals	1	0	1	1.5
19UMA203	BS	Differential Equations and Complex Analysis	3	1	0	4
19UPH205	BS	Physics for Information Science	3	0	0	3
19UCY204	HS	Environmental Science	3	0	0	3
19UCS205	ES	Introduction to computer science and Engineering	3	0	0	3
19UCS206	ES	Programming Using C	3	0	0	3
PRACTICAL						
19UGS210	BS	Energy and Environmental Science Laboratory	0	0	3	1.5
19UCS211	ES	C Programming Laboratory	0	0	3	1.5
		TOTAL	**16**	**1**	**7**	**20.5**
Total No. of Credits – 20.5						

Semester III

Course Code		Course Title	L	T	P	C
THEORY						
19UMA322	BS	Probability, Statistics and Queueing Systems (Common to CSE &IT)	3	1	0	4
19UCS302	PC	Data Structures	3	0	0	3
19UCS303	ES	DigitalElectronics	3	0	0	3
19UCS304	PC	Object Oriented Programming using Java (Common to CSE & CSBS)	3	0	0	3
19UCS305	PC	Operating Systems (Common to CSE & CSBS)	3	0	0	3
19UCS306	PC	Computer Organization (Common to CSE & CSBS)	3	0	0	3
PRACTICAL						
19UCS307	PW	Seminar	0	0	2	1
19UCS308	PC	Data Structures Laboratory	0	0	3	1.5
19UCS309	PC	Java Programming Laboratory (Common to CSE & CSBS)	0	0	3	1.5
19UCS310	PC	Operating Systems Laboratory (Common to CSE & CSBS)	0	0	3	1.5
		TOTAL	**18**	**1**	**11**	**24.5**
Total No. of Credits – 24.5						

Semester IV

Course Code		Course Title	L	T	P	C
THEORY						
19UMA421	BS	Transforms and Discrete Mathematics (Common to CSE &IT)	3	1	0	4
19UCS402	PC	Computer Communications and Networks	3	0	0	3
19UCS403	PC	Design and Analysis of Algorithms	3	1	0	4
19UCS404	PC	Database System Concepts	3	0	0	3
19UEC425	ES	Microprocessors and Microcontrollers	3	0	0	3
PRACTICAL						
19UEC426	ES	Microprocessors and Microcontrollers Laboratory	0	0	3	1.5
19UCS407	PC	Computer Communications and Networks Laboratory	0	0	3	1.5
19UCS408	PC	Database System Concepts Laboratory	0	0	3	1.5
MANDATORY COURSES						
19UGM431	MC	Gender Equality	1	0	0	P/F
19UGM432	MC	Basics of Biology for Engineers	2	0	0	P/F
		TOTAL	**18**	**2**	**9**	**21.5**
Total No. of Credits – 21.5						

Semester V

Course Code		Course Title	L	T	P	C
THEORY						
19UCS501	PC	Internet and Web Technology	2	0	3	3.5
19UCS502	PC	Software Engineering Practices	3	0	0	3
19UCS503	PC	Mobile Applications Design and Development	2	0	3	3.5
19UCS504	PC	Theory of Computation	3	1	0	4
	PE	Professional Elective – I	3	0	0	3
	OE	Open Elective – I	3	0	0	3
19UGS531	BS	Reasoning and Aptitude	1	0	0	1
PRACTICAL						
19UCS507	PW	Creative Thinking and Innovation	0	0	2	1
19UGS532	HS	Soft Skills Laboratory	0	0	3	1.5
		TOTAL	**17**	**1**	**11**	**23.5**
Total No. of Credits – 23.5						

Semester VI

Course Code		Course Title	L	T	P	C
THEORY						
19UCS601	PC	Principles of Compiler Design	3	1	0	4
19UCS602	PC	Cryptography and Network Security	3	0	0	3
19UCS603	PC	Artificial Intelligence and Machine Learning	3	0	0	3
	PE	Professional Elective – II	3	0	0	3
	PE	Professional Elective III	3	0	0	3
	OE	Open Elective – II	3	0	0	3
PRACTICAL						
19UCS607	PW	Product Development Project	0	0	8	4
19UCS608	PC	Artificial Intelligence and Machine Learning Laboratory(Common to CSE and CSBS)	0	0	3	1.5
19UGS633	HS	Interpersonal Skills Development Laboratory	0	0	3	1.5
MANDATORY COURSES						
19UGM632	MC	Indian Constitution	1	0	0	P/F
		TOTAL	**19**	**1**	**14**	**26**
Total No. of Credits – 26						

Semester VII

Course Code		Course Title	L	T	P	C
THEORY						
19UME701	HS	Project Management and Finance	3	0	0	3
19UCS702	PC	Cloud Computing	3	0	0	3
19UCS703	PC	Building Internet of Things	3	0	0	3
	PE	Professional Elective IV	3	0	0	3
	PE	Professional Elective V	3	0	0	3
	OE	Open Elective – III	3	0	0	3
PRACTICAL						
19UCS707	PW	Summer Internship	0	0	0	1
19UCS708	PC	Cloud Computing Laboratory	0	0	3	1.5
19UCS709	PC	Internet of Things Laboratory	0	0	3	1.5
MANDATORY COURSES						
19UGM731	MC	Professional Ethics and human values	2	0	0	P/F
		TOTAL	**20**	**0**	**6**	**22**
Total No. of Credits – 22						

Semester VIII

Course Code		Course Title	L	T	P	C
THEORY						
	PE	Professional Elective VI	3	0	0	3
	OE	Open Elective – IV	3	0	0	3
PRACTICAL						
19UCS801	PW	Project Work	0	0	16	8
		TOTAL	**6**	**0**	**16**	**14**
Total No. of Credits – 14						

TOTAL CREDITS – 175

LIST OF ELECTIVES

Course Code	Course Title	L	T	P	C
19UCS901	Graph Theory	3	0	0	3
19UCS902	Parallel andDistributedAlgorithms	3	0	0	3
19UCS903	Quantum Computing	3	0	0	3
19UCS904	Information theory and Coding	3	0	0	3
19UCS905	Embedded Systems	3	0	0	3
19UCS906	Fault Tolerant Computing	3	0	0	3
19UCS907	Ad Hoc and Sensor Networks	3	0	0	3
19UCS908	Computer Graphics	3	0	0	3
19UCS909	Data Mining	3	0	0	3
19UCS910	Neural Networks and Deep Learning	3	0	0	3
19UCS911	Speech and Natural Language Processing	3	0	0	3
19UCS912	Data Analytics	3	0	0	3
19UCS913	Information Retrieval	3	0	0	3
19UCS914	Expert Systems	3	0	0	3
19UCS915	Image Processing	3	0	0	3
19UCS916	Introduction to Digital Signal Processing	3	0	0	3
19UCS917	Human Computer Interaction	3	0	0	3
19UCS918	Blockchain Technology	3	0	0	3
19UCS919	Cyber Security	3	0	0	3
19UCS920	Multicore Programming	3	0	0	3
19UCS921	Information Storage Management	3	0	0	3
19UCS922	C# and .NET Framework	3	0	0	3
19UCS923	Game Programming	3	0	0	3
19UCS924	Fuzzy logic	3	0	0	3
19UCS925	Mobile and Pervasive computing	3	0	0	3
19UCS926	Business Intelligence and its applications	3	0	0	3
19UCS927	Mixed Reality	3	0	0	3

Course Code	Course Title	L	T	P	C
19UCS928	Green Computing	3	0	0	3
19UCS929	Advanced Java Programming	3	0	0	3
19UCS930	XML and Webservices	3	0	0	3
19UCS931	Distributed Systems	3	0	0	3
19UCS932	Robotics and Applications	3	0	0	3
19UCS933	E-Learning Concepts	3	0	0	3
19UIT911	Building Enterprise Applications	3	0	0	3
19UIT912	Software Testing	3	0	0	3

OPEN ELECTIVES OFFERED TO OTHER PROGRAMMES

Course Code	Course Title	L	T	P	C
19UCS971	Digital Marketing	3	0	0	3
19UCS972	Social Network Analysis Concepts	3	0	0	3
19UCS973	Java fundamentals	3	0	0	3
19UCS974	Cloud and Bigdata	3	0	0	3
19UCS975	Scripting Languages	3	0	0	3
19UCS976	Digital Automation with IOT	3	0	0	3
19UCS977	Programming and Data Structures	3	0	0	3
19UCS978	Introduction to CProgramming	3	0	0	3
19UCS979	Machine learning for Engineers	3	0	0	3

LIST OF ONE CREDIT COURSES

Course Code	Course Title	L	T	P	C
19UCS861	R Programming	0	0	2	1
19UCS862	Server Side Scripting	1	0	0	1
19UCS863	Client side Scripting	1	0	0	1
19UCS864	Ruby on Rails	1	0	0	1
19UCS865	Wordpress	1	0	0	1
19UCS866	Multimedia	1	0	0	1
19UCS867	Mongo DB	0	0	2	1
19UCS868	Software Testing Tools	1	0	0	1
19UCS869	Animation Graphics	0	0	2	1
19UCS870	UML Modeling	0	0	2	1
19UCS871	Game Development	0	0	2	1
19UCS872	Comprehension-1(Data Strutures and Algorithms-INFYTQ)	0	0	2	1
19UCS873	Comprehension-2 (DBMS-INFYTQ)	0	0	2	1

Semester I

Course Code		Course Title	L	T	P	C
THEORY						
19UGM131	MC	Induction Programme				
19UEN101	HS	English for Technical Communication	2	0	0	2
19UMA102	BS	Engineering Mathematics-I	3	1	0	4
19UPH103	BS	Engineering Physics	3	0	0	3
19UCY105	BS	Applied Chemistry	3	0	0	3
19UCS108	ES	Problem Solving and PYTHON programming	3	0	0	3
19UME109	ES	Engineering Graphics & Design	3	1	0	4
PRACTICAL						
19UCS110	ES	Problem Solving and PYTHON programming Laboratory	0	0	3	1.5
19UCS112	ES	Engineering Fundamentals Laboratory	0	0	3	1.5
19UGS113	BS	Basic Sciences Laboratory	0	0	2	1
		TOTAL	**17**	**2**	**8**	**23**
Total No. of Credits – 23						

19UGM131	INDUCTION PROGRAMME	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To rejuvenate the Body and Mind
- To strengthen Attitude and soft skills
- To practice Moral values of life.

UNIT I	PHYSICAL ACTIVITY	10 Hrs

Zumba - Bokwa Fitness – Yoga – Mediation – Fine Arts

UNIT II	CREATIVE ARTS	5 Hrs

Painting – Class Painting – Wall Painting – Art from waste

UNIT III	UNIVERSAL HUMAN VALUES & EMINENT SPEAKERS	5 Hrs

Ethical values – Ambition and Family Expectation, Gratitude, Competition and Excellence – Belief – Morality of life – Guest Lecture by Eminent personality

UNIT IV	LITERARY	

Elocution - Essay writing Competition - Impromptu Session - Dance and singing competition

UNIT V	PROFICIENCY MODULES	15 Hrs

Toastmaster club meet

UNIT VI	INDUSTRIAL & LOCAL VISIT	8 Hrs

Vaigai Dam – Theni - VOC- Port-Tuticorin - Madurai Radio City-Madurai - Aavin Milk –Madurai-NSS Activities.

UNIT VII	FAMILIARIZATION OF THE DEPT. AND INNOVATION	2 Hrs

Department Introduction and Purpose of Course - Eminent speakers – Scope and Feature of the Course - Latest Innovation

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Practice physical activities regularly.
- Implement creativity in drawing and waste material.
- Communicate their ideas effectively.

- Identify inputs and outputs of different industry process.
- Describe the scope and features of their programme of study.

REFERENCE BOOK:

1. Student Induction Programme: A Detailed Guide by AICTE, New Delhi.

19UEN101	ENGLISH FOR TECHNICAL COMMUNICATION	L	T	P	C
		2	0	0	2

PRE-REQUISITE:

COURSE OBJECTIVES :

- To enhance the vocabulary of students
- To strengthen the application of functional grammar and basic skills
- To improve the language proficiency of students

UNIT I		8 Hrs

Listening –Formal and informal conversations and comprehension **Speaking-** introducing oneself – exchanging personal and social information- **Reading** – Skimming and Scanning. **Writing –** Sentence Formation, Formal Letters (Permission/Requisition) - **Grammar** - Parts of Speech - Tense - **Vocabulary Development** – Technical Word Formation- Prefix- suffix - Synonyms and Antonyms- Phrases and Clauses

UNIT II		8 Hrs

Listening– Telephonic Conversations**. Speaking** – Pronunciation rules with Stress pattern. **Reading** – comprehension-pre-reading, post-reading- comprehension questions **Writing** – Punctuation rules, paragraph writing- topic sentence- main ideas- free writing, short narrative descriptions, Precise writing, Developing Hints - Report Writing (Industrial, Accident) - **Grammar** – Voice **Vocabulary Development**- Words from other languages in English.

UNIT III		7Hrs

Listening – Motivational speech by Great Speakers **Speaking** –Narrating daily events -retelling short stories. Reading – Newspaper reading. **Writing –** Job application letter - Transformation of Information (Transcoding) –**Grammar** Subject-Verb Agreement (Concord),— **Vocabulary Development** –Same word in different parts of speech

UNIT IV		7 Hrs

Listening – Understating the instruction. **Speaking** -Intonation and preparing dialogue on various formal and informal situation **Reading** –Note Making from given text - **Writing** –Creating coherence, Essay writing with proper introduction and conclusion, Giving Instruction (Guidance/Procedure) - **Grammar** – Spot the Errors in English, **Vocabulary Development** – One word substitution.

TOTAL : 30 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply grammar effectively in writing meaningful sentences and paragraphs. (Apply)
- Exhibit reading skills and comprehension to express the ideas in the given text. (Understand)
- Develop writing skills to present the ideas in various formal situations. (Create)
- Develop oral fluency to express the ideas in various formal situations.(Create)
- Exhibit writing skills to prepare reports for various purposes.(Create)

TEXT BOOK:

1. KN Shoba, Lourdes JoavaniRayen, Communicative English, New Delhi, Cambridge University Press, 2017

REFERENCE BOOKS:

1. Raman, Meenakshi, Sangeetha Sharma, Business Communication, New Delhi, Oxford University Press, 2014.
2. Lakshminarayanan. K.R, English for Technical Communication, Chennai, Scitech Publications (India) Pvt. Ltd, 2004.
3. Rizvi. Asraf M, Effective Technical Communication, New Delhi, Tata McGraw-Hill Publishing Company Limited, 2007.

19UMA102	ENGINEERING MATHEMATICS – I (Common to ALL Branches – Except CSBS))	L	T	P	C
		3	1	0	4

PRE-REQUISITE:

COURSE OBJECTIVES :

- To make the students capable of identifying linear equations based problems (Eigen Value) from practical areas and obtain the Eigen value oriented solutions in certain cases.
- To widen the students' knowledge base on linear algebra, growth rate computation and application of integrals.
- Able to integrating various types of functions using various integration methods.
- To familiarize the students with the basic rules of differentiation and use them to find derivatives of products and quotients of functions
- To apply these mathematical concepts (matrix theory, differentiation and integration) in engineering field.

UNIT I	MATRICES	8+3 Hrs

Eigen value and eigenvector of a real matrix – Characteristic equation – Properties – Cayley-Hamilton theorem (excluding Proof) – Orthogonal reduction –(transformation of a symmetric matrix to diagonal form) – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation

UNIT II	DIFFERENTIAL CALCULUS	9 +3 Hrs

Introduction – Definition of derivatives – Limits and Continuity – Differentiation techniques (Product rule, Quotient rule, Chain rule) – Successive differentiation (n^{th} derivatives) – Leibnitz theorem (without proof) – Maclaurin's series – Physical Applications (Newton's law of cooling – Heat flow problems, Rate of decay of radioactive materials - Chemical reactions and solutions, Ohm's law, Kirchoff's law – Simple electric circuit problems)

UNIT III	FUNCTIONS OF SEVERAL VARIABLES	9 +3Hrs

Partial derivatives – Euler's theorem for homogenous functions – Total derivatives – Differentiation of implicit functions – Jacobian – Taylor's expansion – Maxima and Minima – Method of Lagrangian Multipliers.

UNIT IV	INTEGRAL CALCULUS	8+3 Hrs

Definitions and concepts of integrals – Methods of integration (Decomposition method, Substitution method, Integration by parts) – Definite integrals – Properties and problems – Reduction formulae – Beta and Gamma functions.

UNIT V	MULTIPLE INTEGRALS	8+3 Hrs

Double integration – Cartesian and Polar coordinates – Change of order of integration – Area as a double integral - Change of variables between Cartesian and Polar coordinates – Triple integration in Cartesian coordinates – Volume as triple integral.

SUPPLEMENT TOPIC (for internal evaluation only-)	**3 Hrs**

Evocation /Application of Mathematics, Quick Mathematics – Speed Multiplication and Division Applications of Matrices.

TOTAL : 45 (L) + 15 (T) = 60 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the Characteristic Equation, Characteristic roots and use the applicability of Cayley – Hamilton theorem to find the Inverse of matrix. (Apply)
- Analyze functions using limits, continuity, derivatives and to solve Physical application problems.(Analyze)
- Apply differentiation techniques and Lagrange multiplier method to predict the extreme values of the functions with constrain. (Apply)
- Apply the concept of some special function like Gamma, Beta function and their relation to evaluate some definite integral. (Apply)
- Apply integration to compute Multiple integrals, Area and Volume in addition to change of order and change of variables. (Apply)
- Understand the basic concept in Matrix, Differentiation and Integration. (Understand)

TEXT BOOKS:

1. BALI N. P and MANISH GOYAL, “A Text book of Engineering Mathematics”, Laxmi Publications (P) Ltd, New Delhi, 8th Edition, (2011).
2. VEERARAJAN.T “Engineering Mathematics” Tata McGraw Hill Publishing Company, New Delhi, vol 15.
3. GREWAL. B.S, “Higher Engineering Mathematics”, Khanna Publications, New Delhi, 42nd Edition, (2012).

REFERENCE BOOKS:

1. RAMANA B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, 11th Reprint, (2010).
2. GLYN JAMES, “Advanced Engineering Mathematics”, Pearson Education, New Delhi, 7th Edition, (2007).
3. JAIN R.K and IYENGAR S.R.K,” Advanced Engineering Mathematics”, Narosa Publishing House, New Delhi, 3rd Edition, (2007).
4. BHARATI KRISHNA TIRTHAJI, “Vedic Mathematics - Mental Calculation”, MotilalBanarsi Dass Publications, New Delhi, 1st Edition, (1965).
5. KREYSZIG. E, “Advanced Engineering Mathematics”, John Wiley & Sons, New York, 10th Edition, (2011).
6. P.SIVARAMAKRISHNA DAS, E.RUKMANGADACHARI“Engineering mathematics”, volume1, Pearson Edison New Delhi, 2nd Edition, (2013).

19UPH103	ENGINEERING PHYSICS (Common To All Branches)	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To develop the research interest in crystal physics.
- To use the principles of Lasers and its types.
- To apply principles of Quantum physics in engineering field.
- To develop knowledge about the properties of materials.

UNIT I	CRYSTAL STRUCTURE	12Hrs

Introduction – Classification of solids –Space lattice –Basis-Lattice parameter – Unit cell – Crystal system –Miller indices –d-spacing in cubic lattice - Calculation of number of atoms per unit cell – Atomic radius-Coordination number – Packing factor for SC, BCC, FCC and HCP structures – crystal imperfection – Burger vector.

UNIT II	PHOTONICS	10 Hrs

Introduction- Principles of Laser- Characteristics of laser -Spontaneous and stimulated emission – Population inversion – Einstein's A and B coefficients - Pumping methods – Basic components of Laser - Types of lasers – Nd -YAG laser - CO2 laser –Holography –Construction and Reconstruction of hologram – Industrial and Medical Applications.

UNIT III	QUANTUM MECHANICS	13 Hrs

Introduction - Black body radiation – Planck's law of radiation- Wien's displacement law-Rayleigh Jeans law- – Compton Effect – Theory and experimental verification – Matter waves-Schrodinger's wave equation – Time dependent – Time independent equation –Particle in 1-D dimensional box

UNIT IV	PROPERTIES OF SOLIDS	10 Hrs

Introduction - Elasticity- Stress and Strain - Hooke's law – Three moduli of elasticity –stress-strain curve – Poisson's ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever – Young's modulus by uniform bending –I- shaped girders.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

Classify the types of crystals, lasers and elastic behavior of solids (U)
Apply the basic knowledge of crystal, quantum mechanics and mechanical behavior of solids to solve engineering problems (AP)
Apply the principle of laser to estimate the wavelength of emitted photons. (AP)
Analyze the dual nature of matter using the concepts of quantum mechanics(AN)
Analyze the structural and optical properties of crystals in industrial and medical applications (AN)
Analyze the structural and optical properties of materials for specific Engineering Applications. (AN)

TEXT BOOKS:

1. Dr. Mani.P, “Engineering Physics”, Dhanam Publications, Edition ,2018, Chennai.
2. Rajendran.V, “Engineering,Physics”, Tata Mc-Graw Hill Publishing Company limited, New Delhi, Revised Edition 2018.
3. Palanisami P.K., “Physics For Engineers”, Scitech Publications (India), Pvt Ltd., Chennai, 2018.

REFERENCE BOOKS:

1. Raghuvenshi G.S., “Engineering Physics”, PHI Learning Private Limited, New Delhi, Revised Edition 2018.
2. Arul doss .G., “Engineering Physics”, PHI Learning Limited, New Delhi, Revised Edition 2018.
3. Marikani .A., “Engineering Physics”, PHI Learning Private Limited, New Delhi, Revised Edition 2017.
4. Sankar B.N., and Pillai .S.O., “A Text book of Engineering Physics”, New Age International Publishers Private Limited, New Delhi, Revised Edition 2017.
5. Avadhanulu M.N. and Kshirsagar P.G., “A Textbook: of Engineering Physics”, S.Chand& Company Ltd., New Delhi, 2018.

19UCY105	APPLIED CHEMISTRY	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To gain the knowledge on Chemical bonding andtypes.
- To make the students conversant with boiler feed water requirements, related problems and water treatmenttechniques.
- To know the importance of smart material and greenchemistry.
- To acquire knowledge on energy storagedevices

UNIT I	CHEMICAL BONDING	11 Hrs

Chemical Bonding: Electronic Configuration– Ionic Bond - Covalent Bond – Metallic bond –Aufbau principle, Pauli Exclusion principle, Valence bond theory application and its limitations, Various types of hybridization (sp, sp^2,sp^3) (C_2H_2, C_2H_4, CH_4) -bond strength and bond energy - Hydrogen bonding, Vander Waalsforces*.*

UNIT II	WATER AND ITS TREATMENT TECHNOLOGIES	11 Hrs

Hardness of water–types–expression of hardness(Problems)–units–estimation of hardness of water by EDTA – boiler troubles (scale and sludge) – Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) – External treatment Ion exchange process - Zeolite process – desalination of brackish water – Reverse Osmosis.

UNIT III	SMART MATERIALS ANDGREEN CHEMISTRY	11Hrs

Introduction to smart materials and their structure - Organic Light Emitting Diodes – Principles and applications, Liquid crystals – definition and applications.Green chemistry – Concept, importance, principles – e- waste disposal.

UNIT IV	ENERGY STORAGE DEVICES	12Hrs

Batteries, fuel cells and super capacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery)fuelcells–H2-O2fuel cell and application.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Describe the fundamental concepts of chemical bonds.(Understand)
- Apply the knowledge of water treatment techniques to remove the hardness of water. (Apply)
- Explain the principles and application of organic light emitting diodes, liquid crystals and

green
chemistry.(Understand)

- Describe the importance of energy storage devices and super capacitors (Understand)

TEXT BOOKS:

1. JainP.C.andMonicaJain,“EngineeringChemistry”,DhanpatRaiPublishingCompany (P) Ltd, New Delhi, 2002.
2. Dr.Sunita Rattan, “A Textbook of Engineering Chemistry” S.K.Kataria&Sons.,New Delhi, 2013.

REFERENCE BOOKS:

1. DerekPletcherandFrankC.Walsh,“IndustrialElectrochemistry”,ChapmanandHall, New York, 1993.
2. Peter Grundler, “ Chemical Sensors – An introduction for Scientists andEngineers”, Springer, New York, 2007.

19UCS108	PROBLEM SOLVING AND PYTHON PROGRAMMING (Common to ALL Branches)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To impart the concepts in problem solving for computing
- To familiarize the logical constructs of programming
- To illustrate programming in Python.

UNIT I	INTRODUCTION	9Hrs

Definition and basic organization of computers – classification of computers – Software – Types of software – types of programming paradigms - Translators: compiler and interpreter – Problem solving tools: Algorithms – Flowchart – Pseudo code.

UNIT II	INTRODUCTION TO PYTHON	9Hrs

Introduction to python – features of python – modes of working with python. Values and data types: numbers, Boolean, strings; variables, expressions, statements, tuple assignment, precedence of operators, comments – print function- conversion of algorithm in to program – Solving simple problems involving arithmetic computations and sequential logic to solve.

UNIT III	CONTROL CONSTRUCTS	9Hrs

Flow of execution – control structures: conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass – Solving problems involving decision making and iterations

UNIT IV	FUNCTIONS AND PACKAGES	9Hrs

Functions - function definition and use, flow of execution, parameters and arguments; parameters, local and global scope, function composition-Anonymous or Lambda Function, recursion -packages.

UNIT V	LISTS, TUPLES, DICTIONARIES AND STRINGS	9Hrs

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, listparameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension - Strings: string slices; immutability, string functions and methods, string module

TOTAL: 45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Utilize problem solving tools in solving computing problems.(Apply)
- Solve mathematical expressions involving sequential logic in python.(Apply)
- Solve problems using python using decision structure and looping constructs.(Apply)
- Write modular programs using functions and packages .(Apply)
- Manipulate data using List, Tuples, Dictionaries and strings.(Apply)

TEXT BOOKS :

1. Ashok NamdevKamthane&Amit Ashok Kamthane, “Problem solving and python programming”, McGraw Hill Education, 2018 (copyright)
2. Anurag Gupta & G P Biswas, “Python Programming – Problem solving, packages and libraries”, McGraw Hill Education, 2020 (copyright).

REFERENCE BOOKS :

1. John V Guttag, “ Introduction to Computation and Programming Using Python‘‘, Revised and expanded Edition, MIT Press , 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, “Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert, “Fundamentals of Python: First Programs‖, CENGAGE Learning, 2012.
5. Charles Dierbach, “ Introduction to Computer Science using Python: A Computational ProblemSolving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3‖, Second edition, Pragmatic Programmers, LLC, 2013.

19UME109	ENGINEERING GRAPHICS (Common to ALL Branches)	L	T	P	C
		3	1	0	4

PRE-REQUISITE:

COURSE OBJECTIVES :

- To develop student's graphic skill for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technicaldrawings.
- To impart knowledge in development of surfaces, isometric and perspective projections.

	CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)	4 Hrs

Importance of Graphics in Engineering Applications – Use of Drafting Instruments – BIS Conventions and Specifications – Size, Layout and Folding of Drawing Sheets – Lettering and Dimensioning- Introduction to Plane Curves, Projection of Points, Lines and Plane Surfaces

UNIT I	PROJECTION OF SOLIDS	12 Hrs

Projection of simple solids like prisms, pyramids, cylinder and cone with axis is parallel, perpendicular and inclined to one of the plane.

UNIT II	SECTION OF SOLIDS	10 Hrs

Section of solids - simple position with cutting plane parallel, perpendicular and inclined to one of the plane.

UNIT III	DEVELOPMENT OF SURFACES	10 Hrs

Development of lateral surfaces of simple and truncated solids - Prisms, pyramids and cylinders and cones - Development of lateral surfaces of sectioned solids.

UNIT IV	ISOMETRIC PROJECTIONS	12 Hrs

Isometric Projections

Principles of isometric projection – isometric scale – isometric view - isometric projections of simple solids and cut solids.

UNIT V	ORTHOGRAPHIC PROJECTION	12 Hrs

Representation of Three Dimensional objects – General principles of orthographic projection- Need for importance of multiple views and their placement – First angle projection – layout views – layout views – Developing visualization skills of multiple views (Front, top and side views) from pictorial views of objects.

TOTAL 45 (L) + 15 (T) = 60 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the knowledge of First angle of projection and to draw the Projection of different simple solids. (Apply)
- Draw the section of solids with true shape of the section. (Apply)
- Draw the development of lateral surface of regular and sectioned solids. (Apply)
- Draw the isometric view of simple solids and sectioned solids. (Apply)
- Sketch the orthographic views from the given pictorial (isometric) view. (Apply)

TEXT BOOKS:

1. Natarajan K.V., "A Text book of Engineering Graphics", Dhanalakshmi Publishers, (2006).
2. Bhatt N.D., "Engineering Drawing", 46th Edition, Charotar Publishing House,(2003).

REFERENCE BOOKS:

1. Venugopal K., and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited,(2008).
2. Gopalakrishnan K.R., "Engineering Drawing" (Vol.I&II), SubhasPublications.(1998).
3. DhananjayA.Jolhe, "Engineering Drawing with an introduction to Auto CAD", Tata McGraw Hill Publishing Company Limited,(2008).

19UCS110	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY (Common to ALL Branches)	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES :

- To familiarize with programming environment
- To familiarize the implementation of programs in Python

LIST OF EXPERIMENTS

Problems involve Sequential logic and Decision making

1. Write a Python program to process the mark processing system (Record has the following fields: Name, Reg_no, Mark1, Mark2, Mark3, Mark4, Total, average). Print the student details and find the total and average mark.
2. Write a Python program to compute the +2 Cutoff mark, given the Mathematics, physics and Chemistry marks. A college has decided to admit the students with a cut off marks of180. Decide whether the student is eligible to get an admission in that college or not.
3. A pizza in a circular shape with 8 inches and which is placed in a square box whose side length is 10 inches. Find how much of the box is “empty”?
4. A person owns an air conditioned sleeper bus with 35 seating capacity that routes between Chennai to Bangalore. He wishes to calculate whether the bus is running in profit or loss state based on the following scenario:
   Amount he spent for a day for diesel filling is: Rs. 15,000
   Amount he spent for a day for Driver and cleaner beta is: Rs. 3,000
   Ticket amount for a Single person is Rs: 950
   If all the seats are filled, what would be the result?
   If only 15 seats are filled, what would be the result?
5. Consider the person ‘X’ has some amount in his hand and the person ‘Y’ has some amount in his hand. If they wish to exchange the amount among them, how they can exchange the amount by using the third party ‘Z’.

Problems involve iterations

6. A man is blessed with a duck that can lay golden eggs. First day it lays one egg, in second day it lays two eggs, in third day it lays three eggs, and it continues to lay eggs in an incremental manner day by day. Now calculate how many golden eggs that duck lays till ‘n’th day.
7. Four People A,B,C,D are sitting in a Circular arrangement. In how many ways their seating can be arranged.
8. The Greek theater shown at the right has 30 seats in the first row of the center section. Each row behind the first row gains two additional seats. How many seats are in the 5^{th} row in the center section?

Problem involve functions and recursive functions

9. Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle. (Recall from

the Pythagoras theorem that in a right triangle, the square of one side equals the sum of the squares of other two sides)

10. A game has to be made from marbles of five colors, yellow, blue, green, red and Violet where five marbles has to be kept one upon another. Write a python program using recursion, to find how many ways these marbles can be arranged.

11. Tower of Hanoi is a mathematical puzzle where we have three rods and n disks. The objective of the puzzle is to move the entire stack to another rod, obeying the following simple rules:
Here is a high-level outline of how to move a tower from the starting pole, to the goal pole, using an intermediate pole:

    1. Move a tower of height-1 to an intermediate pole, using the final pole.
    2. Move the remaining disk to the final pole.
    3. Move the tower of height-1 from the intermediate pole to the final pole using original pole

Problems involve List and Nested List

12. In a class of 50 numbers of students, 6 students are selected for state cricket academy. Sports faculty of this school has to report to the state cricket academy about the selected students' physical fitness. Here is one of the physical measures of the selected students'; Height in cm is given for those 6 selected students [153,162,148,167,175,151]. By implementing functions, do the following operations.
    (i) State academy selector has to check whether the given height is present in the selected students list or not.
    (ii) State academy selector has to order the height of students in an incremental manner.
    (iii) State academy selector has to identify the maximum height from the list.

Problems involve Dictionary and Tuples

Dictionary

13. A university wishes to create and maintain the details of the students such as Rollno, Regno, Name, Dept, Batch, Contact_no, Nativity(Indian/NRI) as key value pairs. Do the following operations:
    (i) Display the complete student details on giving Rollno as input.
    (ii) Display the complete student details whose nativity belongs to NRI.
    (iii) Display the complete student details whose department is CSE.

Tuples

14. A librarian wishes to maintain books details such as ISBN, Book Name, Author Name, Year published, Publisher Name. He wishes to retrieve the book details in the following scenario:

(i) Retrieve the complete details of the book on giving ISBN.
(ii) Retrieve the details of the book which published after the year 2015.
(iii) Retrieve the details of the book whose author name is 'Andrew'.
(iv) Retrieve the details of the book that name of the book is 'Python'

Problems involve Strings

15. A musical album company has ‘n’ number of musical albums. The PRO of this company wishes to do following operations based on some scenarios:

(i) Name of the album starts with ‘s’ or ‘S’.
(ii) (ii) Name of the album which contains ‘jay’ as substring.
(iii) Check whether the album name presents in the repository or not.
(iv) Count number of vowels and consonants in the given album name.

TOTAL: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Formulate algorithms for simple problems and translate the algorithms to a working program (Apply)
- Formulate algorithms and programs for arithmetic computations and sequential logic.(Apply)
- Write iterative programs using control constructs.(Apply)
- Develop programs using functions, packages and use recursion to reduce redundancy.(Apply)
- Represent data using lists, tuples, dictionaries and manipulate them through a program.(Apply)

HARDWARE AND SOFTWARE REQUIRMENTS

HARDWAREREQUIRMENTS

LAN SYSTEM WITH 30 NODES (OR) STANDALONE PCS – 30 NOS

SOFTWAREREQUIRMENTS

OS – UNIX CLONE **(License free Linux)**

EDITOR – IDLE

19UCS112	ENGINEERING FUNDAMENTALS LABORATORY (Common to CSE, ECE,IT & BME Branches)	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES :

- To familiarize the Hardware components of Computer
- To practice the installation of operating systems and other software's

LIST OF EXPERIMENTS

GROUP A (COMPUTER) 24 Periods

- Demonstrating basic components of a personal computer
- Assembling hardware components of a computer
- Installation of windows and linux operating systems
- Installation of software's both in windows and linux operating system
- Configuring the computer to connect with internet
- PC trouble shooting and maintenance

GROUP B (ELECTRICAL & ELECTRONICS) 21 Periods

- Study of electronic components and equipments-
  a. Resistor color coding
  b. Measurement of AC signal parameter (peak to peak, rms, period, frequency) using CRO
- Study of logic gates
- Soldering practice – components devices and circuits - using general purpose PCB
- Characteristics of LED
- Interfacing of PIR sensor with microcontroller
- Switch control with microcontroller
- Temperature measurement with microcontroller

TOTAL: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Identify the components of the computer and assemble the hardware components of a computer.(Apply)
- Install and uninstall the Operating systems and other software's both in in windows and Linux environment.(Apply)

- Demonstrate the basic network settings and make trouble shoot and Maintain the compute.(Apply)
- Demonstrate the function of electronics components.(Apply)
- Develop code for interfacing sensors with microcontroller. (Apply)

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS

HARDWARE

LAN SYSTEM WITH 30 NODES (OR) STANDALONE PCS – 30 NOS.

SOFTWARE

OS – UNIX CLONE (License free Linux)

EQUIPMENT

SL. NO.	NAME OF THE EQUIPMENT/SOFTWARE	QUANTITY
1	LOGIC TRAINER KIT	2
2	CRO AND AFO	2
3	SMALL MULTIPURPOSE PCBS	5
4	SOLDERING GUNS	5
5	MULTIMETERS	5
6	DC AMMETER	10
7	DC VOLTMETER	10
8	VARIABLE DC POWER SUPPLY	5
9	NODE MCU DEVELOPMENT BOARD	10
10	PIR SENSOR (HC-SR501)	5
11	TEMPERATURE SENSOR (LM35 OR DHT11)	5
12	PC WITH WINDOWS 7	3

19UGS113	BASIC SCIENCES LABORATORY	L	T	P	C
		0	0	2	1

PRE-REQUISITE :

COURSE OBJECTIVES:

- To create scientific Temper among the students.
- To know how to execute experiments properly, presentation of observations and arrival of conclusions.
- To view and realize the theoretical knowledge acquired by the students through experiments
- To impart knowledge on basic concepts in applications of chemical analysis
- Train the students to handle various instruments.
- To acquire knowledge on the chemical analysis of various metalions.

PHYSICS LABORATORY

LIST OF EXPERIMENTS

1. Laser – Determination of particle size and wavelength of Laser source. using Diode Laser.
2. Ultrasonic Interferometer - Determination of velocity of sound in liquid and compressibility of liquid.
3. Poiseuille's method - Determination of Coefficient of viscosity of liquid.
4. Spectrometer – Determination of dispersive power of a prism.
5. Air Wedge method - Determination of thickness of a thin wire.
6. Uniform bending method – Determination of Young's modulus of the given rectangular beam.

CHEMISTRY LABORATORY

LIST OF EXPERIMENTS

1. Preparation of molar and normal solutions of the following substances – Oxalic acid , Sodium Carbonate , Sodium Hydroxide and Hydrochloric acid
2. Conductometric Titration of strong acid with strong base
3. Conductometric Titration of Mixture ofAcids
4. Estimation of Iron by Potentiometry
5. Determination of Strength of given acid using pH metry

6. Determination of molecular weight of polymer by Viscometry
7. Comparison of the electrical conductivity of two samples- Conductometric method
8. Estimation of copper in brass by EDTA method

TOTAL : 30 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the principles of Optics, Laser physics and Mechanics to determine the Engineering properties of materials. (Apply)
- Analyze the given liquid sample to determine the viscosity and compressibility of the liquid.(Analyze)
- Apply the principles of spectroscopy to determine the properties using prism.(Apply)
- Prepare solutions on various concentrations. (Apply)
- Analyse the given solution quantitatively using chemical and electro analytical methods.(Analyze)
- Determine the amount and molecular weight of the given substances.(Apply)

A minimum of FIVE experiments shall be offered for every course
Laboratory classes on alternate weeks for Physics and Chemistry

SEMESTER- II

Semester II

Course Code		Course Title	L	T	P	C
THEORY						
19UEN201	HS	Communication Skills for Professionals	1	0	1	1.5
19UMA203	BS	Differential Equations and Complex Analysis	3	1	0	4
19UPH205	BS	Physics for Information Science	3	0	0	3
19UCY204	HS	Environmental Science	3	0	0	3
19UCS205	ES	Introduction to computer science and Engineering	3	0	0	3
19UCS206	ES	Programming Using C	3	0	0	3
PRACTICAL						
19UGS210	BS	Energy and Environmental Science Laboratory	0	0	3	1.5
19UCS211	ES	C Programming Laboratory	0	0	3	1.5
		TOTAL	**16**	**1**	**7**	**20.5**
Total No. of Credits – 20.5						

19UEN201	COMMUNICATION SKILLS FOR PROFESSIONALS	L	T	P	C
		1	0	1	1.5

PRE-REQUISITE:

COURSE OBJECTIVES :

- Improve their oral expression and thought
- Develop their confidence and ability to speak in public
- Develop their capacity for leadership.

Project 1	SELF INTRODUCTION & DELIVER A SPEECH BEFORE AUDIENCE	Time: 5 to 7 minutes

- To Speak in front of an audience with courage.
- Make your message clear, with supporting material.
- Create a strong opening and conclusion

Project 2	SPEAK ON THE CHOSEN CONTENT	Time: 5 to 7 minutes

- Select a general topic and bring out specific purposes.
- Avoid using notes.
- Use symbolic ideas to develop your ideas.

Project 3	USE EFFECTIVE BODY LANGUAGE & INTONATION	Time: 5 to 7 minutes

- Use appropriate posture, gestures, facial expressions and eye contact to express your ideas.
- Use proper intonation and adequate speech module.

Project 4	PRESENT YOUR TOPIC WITH VISUAL AIDS	Time: 5 to 7 minutes

- Persuade your points with suitable illustration, specific facts, examples
- Use suitable visual aids to present your topic with confidence.

Project 5	GRASP THE ATTENTION OF THE AUDIENCE	Time: 5 to 7 minutes

- Influence your listeners by adopting holistic viewpoint.
- Use emotions, stories, and positive quotes in your speech.

TOTAL : 30 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply Language skills to write and speak effectively .(Create)
- Select the right words and sentence to communicate ideas clearly and accurately .(Create)
- Exhibit good postures and proper attire to present the ideas effectively.(Create)
- Present the ideas effectively using visual aids. (Create)
- Communicate with clarity and present the ideas effectively to the audience.(Create)

REFERENCE BOOKS:

1. Competent Communication- A Practical Guide to becoming a better speaker, Toastmasters International, USA.
2. Norman Lewis – Word Power Made Easy, Pocket Book Publication, 2019.

19UMA203	DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS (COMMON TO CSE & IT)	L	T	P	C
		3	1	0	4

PRE-REQUISITE:

COURSE OBJECTIVES :

- To develop an understanding of the basics of vector calculus comprising of gradient, divergence and curl, and line, surface and volume integrals and the classical theorems involving them.
- To acquaint the student with the concepts of analytic functions and their interesting properties which could be exploited in a few engineering areas, and be introduced to the host of conformal mappings with a few standard examples that have direct application.
- To make the student knowledgeable in formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.

UNIT I	SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS	9+3 Hrs

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Applications of ODE in Computer Science Engineering

UNIT II	VECTOR CALCULUS	9+3 Hrs

Gradient Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopiped.

UNIT III	ANALYTIC FUNCTIONS	9 +3 Hrs

Functions of a complex variable – Analytic function – Necessary and Sufficient Conditions (excluding Proofs) – Harmonic function - Properties of an analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping- Simple transformation w = z+c, cz, 1/z, and Bilinear transformation..

UNIT IV	COMPLEX INTEGRATION	9 +3 Hrs

Statement and applications of Cauchy's integral theorem, Cauchy's integral formula and Cauchy Residue Theorem – Taylor's and Laurent's expansions – Applications of residue theorem to evaluate real integrals – Unit circle and semi-circular contour (excluding Poles on the real axis).

UNIT V	PDE & APPLICATION OF PDE	9+3 Hrs

Formation of partial differential equations – Singular integrals- Lagrange's linear equation -- Linear

partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types- Solutions of one dimensional wave equation

TOTAL : 45 (L) + 15 (T) = 60 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the knowledge of higher order ordinary differential equations in real life engineering problems.(Apply)
- Apply the concept of vector identities in problem solving and evaluate the line, surface and volume integrals. (Apply)
- Apply the knowledge of standard techniques of complex variables and mapping for evaluating analytically. (Apply)
- Apply the knowledge of singularities, residues in complex integration. (Apply)
- Apply the knowledge of partial differential equation in solving linear, higher order and one dimensional Wave equation. (Apply)
- Understand the knowledge of Cauchy Riemen equations , poles, homogeneous and non-homogeneous equation. (Understand)

TEXT BOOKS:

1. VEERARAJAN.T "Engineering Mathematics" Tata McGraw Hill Publishing Company, New Delhi, vol 15.
2. BALI N. P and MANISH GOYAL, "Text book of Engineering Mathematics", Laxmi Publications (P) Ltd., New Delhi, 3rd Edition, (2008).
3. THOMAS G.B. and FINNEY R.L. "Calculus and Analytic Geometry", 9th Edition, Pearson Reprint 2002.

REFERENCE BOOKS:

1. RAMANA B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 11th Reprint, (2010).
2. KREYSZIG. E, "Advanced Engineering Mathematics", John Wiley & Sons, New York, 10th Edition, (2011).
3. JAIN R.K and IYENGAR S.R.K, "Advanced Engineering Mathematics", Narosa Publishing House Pvt. Ltd., New Delhi, 3rd Edition, (2007).
4. GREWAL. B.S, "Higher Engineering Mathematics", Khanna Publications, New Delhi, 43rd Edition, (2014).

19UPH205	PHYSICS FOR INFORMATION SCIENCE (COMMON TO EEE,CSE & IT BRANCHES)	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To introduce the essential principles of physics for information science and related Engineering applications.
- To demonstrate the concepts of conduction in conductors.
- To enable the students to understand the dielectric and magnetic materials.
- To apply fundamental knowledge in the area of fiber optics.

UNIT I	CONDUCTING MATERIALS	12 Hrs

Introduction-Conduction in metals-mobility and conductivity – classical free electron theory of metals –merits and demerits- Electrical and thermal conductivity (derivation)– Wiedemann – Franz law – Lorentz number– Fermi distribution function-Effect of temperature on Fermi function-Density of energy states – carrier concentration in metals.

UNIT II	TRANSPORT PROPERTIES OF SEMICONDUCTORS	10Hrs

Introduction- Properties-Types of semiconductor –Electron and hole concentration -Intrinsic Carrier Concentration–Expression for electrical conductivity of a semiconductor-Band gap determination-Hall effect and its applications.

UNIT III	MAGNETIC AND DIELECTRICS MATERIALS	13Hrs

Introduction–Classification of magnetic materials – Domain theory – Hysteresis –soft and hard magnetic material-Ferrites-Magnetic storage devices-hard disc-compact disc-RAM-ROM-Applications -Introduction- Types of polarization – Dielectric loss-Dielectric breakdown-Capacitor and its types- Applications

UNIT IV	FIBRE OPTIC COMMUNICATION	10 Hrs

Introduction- Liquid crystal-LCD and its phases-LED-Diode Laser-Principle and propagation of optical fibres - Types of optical fibre- Attenuation- Fibre optic communication systems (Block diagram)- Fibre optic sensors –Temperature and pressure sensor-Applications.

TOTAL:45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Illustrate classical and Quantum free electron theory and calculate carrier concentration in metals.(Understand)
- Examine the characteristics of semiconducting materials in terms of bandgap and charge carriers.(Analyze)
- Distinguish the properties of magnetic materials and their domain theory for the applications of storage devices.(Analyze)
- Discuss the types of polarization mechanism in dielectrics and its applications. (Understand)
- Describe the principlesand propagation of light in fiber optical communication System.(Understand)
- Utilize the fundamentals of physics to improve the technology in communication.(Apply)

TEXT BOOKS:

1. William D. Callister, Jr. “Material Science and Engineering”, Seventh Edition, John Wiley & Sons Inc. New Delhi, 2015
2. Dr. Mani.P, “Engineering Physics II ”, Dhanam Publications, Edition ,2018, Chennai
3. Rajendran.V, “Engineering,Physics”, Tata Mc-Graw Hill Publishing Company limited, New Delhi, Revised Edition 2016.

REFERENCE BOOKS:

1. Raghuvenshi G.S., “Engineering Physics”, PHI Learning Private Limited, New Delhi, Revised Edition 2014.
2. Arul doss .G., “Engineering Physics”, PHI Learning Limited, New Delhi, Revised Edition 2013.
3. Marikani .A., “Engineering Physics”, PHI Learning Private Limited, New Delhi, Revised Edition 2012.
4. Sankar B.N., and Pillai .S.O., “Engineering Physics – I”, New Age International Publishers Private Limited, New Delhi, Revised Edition 2015.

19UCY204	ENVIRONMENTALSCIENCE	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To understand the concepts of Environment andecosystem.
- To acquire knowledge about the impact of environmentalpollution.
- To understand the importance of environmental issues in thesociety.
- To gain knowledge about the impact of environment related to humanhealth.
- To gain knowledge in alternativeenergies.

UNIT I	ENVIRONMENTAND ECOSYSTEMS	9Hrs

Definition, scope and importance of environment – Need for public awareness – Conceptofecosystem–Structureandfunctionofecosystem–Producers,consumersand decomposers-Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Aquatic ecosystems (c) Grasslandecosystem.

UNIT II	ENVIRONMENTALPOLLUTION	9Hrs

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermalpollution- pollution case studies - Role of an individual in prevention of pollution –Disaster management: floods, earthquake, cyclone and landslides.

UNIT III	SOCIAL ISSUES ANDTHEENVIRONMENT	9Hrs

Water conservation, rain water harvesting, watershed management – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. Environmental laws/Acts, (EPA).

UNIT IV	HUMAN POPULATION ANDTHEENVIRONMENT	9Hrs

Population growth, variation among nations – Population explosion – Human rights – Family welfare programme – Environment and Human Health – Human Rights-Value education – HIV / AIDS – Women and child welfare – Role of information technology in environment and human health.

UNIT V	FUTURE POLICYAND ALTERNATIVES	9Hrs

Introduction to future policy and alternatives-fossil fuels-nuclear energy-solar energy-wind energy - hydroelectric energy-geothermal energy - tidal energy – sustainability - green power-nanotechnology.

Total: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Express the concepts of an ecosystem. (Understand)
- Describe the impact of environmental pollution. (Understand)
- Explain the importance of environmental issues to the society. (Understand)
- Analyze the impact of environmental issues related to human health .(Analyze)
- Identify alternate energy sources for technological applications. (Understand)

TEXT BOOKS:

1. AnubhaKaushik, kaushik C.P., “Environmental Science and Engineering”,Third Edition, New Age International, New Delhi, 2009.
2. Benny Joseph “Environmental Science and Engineering”, Tata Mc-Graw Hill, New Delhi, 2006.

REFERENCE BOOKS:

1. Gilbert M.Masters, ‘Introduction to Environmental Engineering andScience’, Pearson Education,Upper saddle River, New Jersey, 2008.
2. Miller T.G. Jr., Environmental Science”, Wadsworth PublishingCompany, Belmont, California, 2005.
3. De A.K., “Environmental Chemistry”, Wiley Eastern Ltd., New Delhi,2001.
   Trivedi R.K., Goel P.K., “Introduction to Air Pollution”, Techno-Science Publication, Jaipur,2005.

19UCS205	INTRODUCTION TO COMPUTER SCIENCE AND ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To familiarize the computer processors and memory
- To know the types of software and various programming paradigms
- To impart the knowledge in networks, computing techniques and emerging trends

UNIT I	PROCESSORS AND MEMORY	9Hrs

Introduction to circuits – Microprocessor – Microcontroller – Single core processor- Multi core processor – GPU. Memory Types – RAM, ROM, Hard drive, Flash drive, DVD, Blue ray.

UNIT II	SOFTWARES	9Hrs

Software – System software: Operating system – kernel – firmware – middleware – shells – windowing systems. Application software: compilers – DBMS – IDE – text editor – spread sheet – presentation – multimedia.

UNIT III	PROGRAMMING PARADIGMS	9Hrs

Imperative programming paradigm: Procedural- objects oriented - parallel programming. Declarative programming paradigm: Logical programming - functional programming - data base processing

UNIT IV	NETWORKS AND COMPUTING TECHNOLOGIES	9Hrs

Computer Network-Network Types- Topology - Communication medium – Protocols - Internet-IP addresses- DNS-Internet Service Provider - World Wide Web. Personal Computing - Time Sharing Computing - Client Server Computing - Distributed Computing - Grid Computing - Cloud Computing.

UNIT V	EMERGING TRENDS	9Hrs

Artificial Intelligence- Machine learning – Deep Learning – Data Science – Internet of Things – Block chain – Cyber security.

TOTAL: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Illustrate the types of processors and memories in a computing environment. (Understand)
- Classify the types of software's used by the computer and user. (Understand)
- Apply suitable programming paradigm to provide solution for a problem. (Apply)
- Identify the suitable network topology to connect computing system. (Apply)
- Analyze and identify appropriate computing technology to solve the problem. (Apply)
- Articulate the emerging trends in the field of Computer Science and Engineering.(Understand)

TEXT BOOKS:

1. Monograph Prepared by Faculty of CSE, Sethu Institute of Technology.

WEB REFERENCES:

1. https://www.researchgate.net/publication/329191354_Lecture_Notes_on_Computer_Architecture
2. https://ftms.edu.my/v2/wp-content/uploads/2019/02/csca0101_ch07.pdf
3. https://www.academia.edu/3879674/Programming_Paradigm

19UCS206	PROGRAMMING USING C	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To familiarize the programming constructs of C
- To explain the concepts of arrays, functions, pointers, structures in C
- To explain the concepts of file

UNIT I	INTRODUCTION TO C	9Hrs

Introduction to C language – Structure of C program - Character set – token – identifiers – reserved words – Comments - data types – constants – printf() function - variables – scanf() function - operators – expression – declaration statement – assignment statement - conversion of algorithm in to program – Solving simple problems involving arithmetic computations and sequential logic to solve.

UNIT II	C PROGRAMMING CONSTRUCTS	9Hrs

Flow of execution – branching constructs: if, if – else, else if ladder, switch, break – looping constructs: while, do. While, for, break and continue – Solving problems involving decision making and iterations

UNIT III	ARRAYS AND POINTERS	9Hrs

Array definition – one dimensional array declaration – initialization – accessing elements – Solving problems using 1D array manipulation - two dimensional array declaration – initialization – accessing elements – Solving problems for matrix manipulation, and string manipulation Pointers: Declaration – Referencing and Dereferencing – Solving problems of string handling.

UNIT IV	STRUCTURES,UNION AND FUNCTIONS	9Hrs

Structures and Union: Definition – variable declaration – initialization – accessing members – Solving problems using structures and union - pointer to structures - self-referential structures – notion of linked list (without implementation) - Functions: definition – prototype – function call – functions with arguments and without arguments – Parameter passing methods – recursive functions – Solving problems using non-recursive and recursive functions.

UNIT V	FILE PROCESSING	9Hrs

Files – Types of file processing: Sequential access, Random access – Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Transaction processing using random access files – Command line arguments

TOTAL: 45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the knowledge of arithmetic & sequential logic to solve problems related to mathematical expressions. (Apply]
- Analyze and identify suitable control constructs to provide solutions to computer applied complex engineering problems. (Evaluate)

- Apply the concept of pointers to solve complex engineering problems.(Apply)
- Formulate problems to provide solutions to computer applied complex engineering problems using modularity.(Analyze)
- Apply the knowledge of permanent storage of data to solve computer applied complex engineering problems. (Apply)
- Design solutions for computer applied complex engineering problems that meet specified needs.(Create)

TEXT BOOKS :

1. Balagurusamy, E, “Programming in AnsiC”,Eigthh Edition, Tats McGraw-Hill Publishing Company Limited, New Delhi, 2019.
2. Deitel and Deitel, “C How to Program”, Pearson Education, New Delhi, 2011

REFERENCE BOOKS :

1. Yashavant P. Kanetkar. “ Let Us C”, BPB Publications, 2011.
2. Kernighan.B.W ,Ritchie.D.M, “The C Programming language”, Pearson Education,Second Edition, 2006.
3. Stephen G.Kochan, “Programming in C”, Pearson Education India,Third Edition, 2005.
4. Anita Goel ,Ajay Mittal, ” Computer Fundamentals and Programming in C””, Dorling Kindersley (India) Pvt. Ltd, Pearson Education in South Asia, 2011.
5. Byron S Gottfried, ” Programming with C ”, Schaum’s Outlines, Tata McGraw-Hill,Second Edition, 2006.
6. PradipDey, ManasGhosh, “Fundamentals of Computing and Programming in C”, Oxford University Press, First Edition, 2009.

19UGS210	ENERGY AND ENVIRONMENTAL SCIENCE LABORATORY	L	T	P	C
		0	0	3	1.5

PRE-REQUISITE :

COURSE OBJECTIVES:

- To analyze the Band gap, moment of inertia, thermal conductivity and rigidity modulus of the materials.
- To gain knowledge in PHOTONICS.
- Apply the theoretical concepts to perform lab experiments.
- To assess the water quality parameters.
- To acquire knowledge on water quality parameters for the analysis of industrial effluents.

PHYSICS LABORATORY

LIST OF EXPERIMENTS

1. Determination of Energy band gap of a semiconductor.
2. Torsion pendulum – Determination of Moment of inertia of a metallic disc and rigidity modulus of a given metallic wire.
3. Spectrometer - Determination of wavelength of mercury spectrum using grating.
4. Laser – Determination of numerical aperture and acceptance angle of an optical fiber
5. Newton's rings – Determination of radius of curvature of a convex lens
6. Lee's Disc - Determination of thermal conductivity of a bad conductor.
7. Determination of Solar cell Characteristics using optical transducers kit.

CHEMISTRY LABORATORY

LIST OF EXPERIMENTS

1. Estimation of hardness of water by EDTA method.
2. Estimation of alkalinity of water sample.
3. Estimation of Chloride in water sample (Argentometric method)
4. Determination of DO in water
5. Estimation of chromium in tannery wastes
6. Estimation of available chlorine in bleaching powder
7. Estimation of iron by Spectrophotometry.
8. Determination of acidity of industrial effluents.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the principles of Optics, Laser physics and spectroscopy to determine the Engineering properties of materials.(Apply)
- Determine the thermal conductivity of the given material .(Understand)
- Determine the energy gap and specific resistance of the given material.(Understand)
- Test and analyze the water quality parameters for the given sample. (Analyze)

A minimum of FIVE experiments shall be offered

19UCS211	C PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES :

- Familiarize with programming environment
- Familiarize the implementation of programs in C

LIST OF EXPERIMENTS

- **Familiarization with Integrated Development Environment (IDE)**(Compile, Debug)
- **Problems involve arithmetic computations and sequential logic**
  1. Write a program to calculate the slope of a line, given the data for coordinates of the end points of the line.
  2. Write a program to convert polar coordinates to Cartesian coordinates
  3. Write a program to compute the volume of a cylinder with diameter d and height h and print

diameter, height and the volume.

- **Problems involve decision making**
  1. Design a calculator to perform the following operations addition, subtraction, multiplication, division
  2. Write program to find the given year is leap year or not
- **Problems involve iterations**
  1. printing simple series,
  2. Fibonacci sequence
- **Problems involve 1D arrays**
  1. Design an one dimensional array with height of the person and find how many persons are above the average height
  2. Write a program to input a set of integer numbers, count and sum the positive numbers and also count and sum the negative numbers then print the count and sum of all positive numbers and negative numbers.
- **Problems involve 2D arrays**
  1. Design a two dimensional array with height and weight of the persons and compute the body mass index of individuals.
  2. Write a program to multiply two matrices
- **Problems involve structures**
  1. Generate salary slip of an employee and print the salary details of an employee whose first name is “aaa”.
  2. Compute internal marks of students for five different subjects
- **Problems involve functions**
  1. Write a program to check the given number is prime or not using function
  2. From a given paragraph perform the following using inbuilt in functions
     a. Find the total number of words
     b. Capitalize the first word of each sentence
     c. Replace a given word with another word
- **Problems involve recursive functions**
  1. Find the GCD of the given number
- **Problems with File concepts**
  1. Insert, update, delete and append telephone details of an individual’s using file

TOTAL: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Write programs to solve problems involving computations. (Apply)
- Provide modular solution to complex problems to reduce redundancy and to improve code reuse.(Apply)
- Access data stored in secondary storage in sequential and random manner. (Apply)
- Design solutions for computer applied complex Engineering Problems that meet specified needs.

(Create)

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS

HARDWARE

LAN SYSTEM WITH 30 NODES (OR) STANDALONE PCS – 30 NOS

SOFTWARE

OS – UNIX CLONE (LICENSE FREE LINUX)

COMPILER – C

SEMESTER- III

Semester III

Course Code		Course Title	L	T	P	C
THEORY						
19UMA322	BS	Probability, Queueing Theory and Numerical Methods (Common to CSE &IT and CSBS)	3	1	0	4
19UCS302	PC	Data Structures	3	0	0	3
19UCS303	ES	DigitalElectronics	3	0	0	3
19UCS304	PC	Object Oriented Programming using Java	3	0	0	3
19UCS305	PC	Operating	3	0	0	3
19UCS306	PC	Computer Organization	3	0	0	3
PRACTICAL						
19UCS307	PW	Seminar	0	0	2	1
19UCS308	PC	Data Structures Laboratory	0	0	3	1.5
19UCS309	PC	Java Programming Laboratory (Common to CSE & CSBS)	0	0	3	1.5
19UCS310	PC	Operating Systems Laboratory (Common to CSE & CSBS)	0	0	3	1.5
		TOTAL	**18**	**1**	**11**	**24.5**
Total No. of Credits – 24.5						

SEMESTER III

19UMA322	PROBABILITY, QUEUEING THEORY AND NUMERICAL METHODS (COMMON TO CSE AND IT)	L	T	P	C
		3	1	0	4

PRE-REQUISITE:

COURSE OBJECTIVES :

- To make the student acquire sound knowledge of standard distributions that can describe real life phenomena.
- To provide the basic characteristic features of a queuing system and develop the skills in analyzing queuing models.
- To acquaint the student with the roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and Eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.

UNIT I	PROBABILITY & RANDOM VARIABLES	9 +3 Hrs

Axioms of probability - Conditional probability - Total probability - Discrete and continuous random variables - Moments - Moment generating functions and their properties. Binomial, Poisson, Normal and Exponential- Joint probability distributions - Marginal and Conditional distributions – Covariance - Correlation and Regression.

UNIT II	QUEUEING THEORY	9+3 Hrs

Definitions – Basic terms of Queueing theory - Markovian models – Birth and Death Queuing models - Steady state results: Single and multiple server queuing models - Little's Formula - Queues with finite waiting rooms - Finite source models.

UNIT III	CURVE FITTING	9+3 Hrs

Method of Group Averages – The least squares method – Fitting a straight line - Fitting a Parabola - Fitting a curve of the form $y = ax^b$ - Fitting an exponential curve – Method of moments

UNIT IV	SOLUTION OF ALGEBRAIC, TRANSCENDENTAL EQUATIONS AND EIGENVALUE PROBLEMS	9 +3 Hrs

Iteration method – Newton-Raphson method – Gauss Elimination method – Pivoting – Gauss Jordan methods –iterative methods : Gauss Jacobi method ,Gauss Seidel method - Eigen values of a matrix by Power method – Jacobi's method for a real symmetric matrix

UNIT V	NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS	9+3 Hrs

Single step methods: Taylor series method – Euler method, Modified Euler's Method – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods

TOTAL : 45 (L) + 15 (T) = 60 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the knowledge of probability to acquired knowledge of standard Distributions, Correlation and regression .(Apply)
- Analyse the characteristic features queuing systems and queuing models and computer system.(Analyze)
- Apply method of least square and method of moments to fit a straight line and a curve.(Apply)
- Apply numerical techniques to solve linear, nonlinear equations and Eigen value problems of a Matrix by Numerically. (Apply)
- Apply numerical techniques and methods for solving first and second order Ordinary Differential Equation Numerically. (Apply)
- Understand the concept of axioms of probability, Markovian queue and Averages. (Understand)

TEXT BOOKS:

1. GUPTA S.C, KAPOOR V.K. "Fundamental of Mathematical Statistics", 10th Edition,Sultan Chand and Sons, New Delhi, 2002.
2. GREWAL, B.S. "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 35th Edition, (2010).
3. VEERARAJAN T. "Probability, Statistics and Random Process with Queueing theory and Queueing Networks", Tata McGraw Hill Education, New Delhi-6, 4th Edition, (2006).
4. IYENGAR S.R.K , JAIN R.K. , MAHIDEN KUMAR JAIN " Numerical Methods for Scientific and Engineering Computations" New Age International Publishers 7th Edition 2019

REFERENCE BOOKS:

1. ALLEN.A.O, “Probability, Statistics and Queuing Theory with Computer Applications”, Elsevier, New Delhi, 2nd Edition, (2005).
2. TAHA.H. A., “Operations Research-An Introduction”, Pearson Education, New Delhi, 9th Edition, (2010).
3. TRIVEDI.K. S., “Probability & Statistics with Reliability, Queuing & Computer Science Applications”, Prentice Hall of India, New Delhi, 2nd Edition, (2009).
4. JOHNSON R.A, and GUPTA C.B., “Miller and Freund’s Probability and Statistics for Engineers”, Pearson Education, New Delhi, 8thEdition, (2011).
5. SUBRAMANIAN .N “Probability and Queueing Theory “, SCM Publishers 2010.

19UCS302	DATA STRUCTURES	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To impart knowledge on linear and non-linear data structures.
- To learn sorting, searching and hashing algorithms.

UNIT I	LINEAR DATA STRUCTURES-LIST	9Hrs

Basic Terminologies: Elementary Data Organizations, Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation –singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

UNIT II	LINEAR DATA STRUCTURES-STACK, QUEUE	9Hrs

Stack ADT – Operations – Applications – Evaluating arithmetic expressions- Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue – Priority Queue – deQueue – applications of queues.

UNIT III	NON LINEAR DATA STRUCTURES – TREES	9Hrs

Tree ADT – tree traversals – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree -B+ Tree – Heap – Applications.

UNIT IV	NON LINEAR DATA STRUCTURES -GRAPHS	9Hrs

Definition – Representation of Graph – Types of graph – Breadth-first traversal – Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Dijkstra's Single source shortest Path Problem –Minimum Spanning Trees- Applications of graphs.

UNIT V	SEARCHING, SORTING AND HASHING TECHNIQUES	9Hrs

Searching- Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the fundamentals of various Linear and Nonlinear data structures. (Understand)
- Apply the concepts of linear data structures to solve real world problems. (Apply)
- Implement various problem solving strategies to design an efficient framework of solutions using Nonlinear data structures for different problems. (Apply)
- Design optimal solution for complex engineering problems for a given scenario considering the suitability of various data structures. (Analyze)
- Create a mathematical framework for solving the given problem using the concepts of data structures. (Create)

- Describe the way of obtaining the solutions made by the separate team members for the given problem and practice the best one. (Affective Domain)

TEXT BOOKS:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2011
2. Seymour Lipschutz, “Data Structures with C”, McGraw Hill Education, Special Indian Edition, 2014.

REFERENCE BOOKS:

1. ISRD Group, “Data Structures using C”, 2nd Edition, McGrraw-Hill Education (India) Private Limited, 2013.
2. ReemaThareja, “Data Structures Using C”, Oxford University Press, 2011.
3. A.V.Aho, J.E Hopcroft and J.D.Ullman, “Data structures and Algorithms”, Pearson Education, First Edition Reprint 2003.

19UCS303	DIGITAL ELECTRONICS	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To present the Digital fundamentals, Boolean algebra and its applications in digital systems.
- To familiarize with the design of various combinational digital circuits using logic gates.
- To introduce the analysis and design procedures for synchronous and asynchronous sequential circuits.
- To explain the various semiconductor memories and related technology.
- To introduce the electronic circuits involved in the making of logic gates.

UNIT I	DIGITAL FUNDAMENTALS	9 Hrs

Number Systems – Decimal, binary, Octal, Hexadecimal, 1's and 2's complements, Codes- Binary, BCD, Excess3, Gray,Alphanumeric codes, Boolean theorms, Logic gates, Universal gates, Sum of products and Product of sums, Minterms and Maxterms, Karnaugh map Minimization and QuineMcCluskey method of minimization.

UNIT II	COMBINATIONAL CIRCUITS	9 Hrs

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Magnitude Comparator, Code Conversion- Binary to Gray , Gray to Binary, BCD to Excess 3,Multiplexer, Demultiplexer, Decoder, Encoder, Priority Encoder

UNIT III	SYNCHRONOUS SEQUENTIAL CIRCUITS	9 Hrs

Flip flops- SR,JK,T,D, Master/Slave FF –operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation- Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

UNIT IV	ASYNCHRONOUS SEQUENTIAL CIRCUITS	9Hrs

Analysis and design of asynchronous sequential circuits,cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Design of Hazard free circuits.

UNIT V	MEMORY DEVICES AND DIGITAL INTEGRATED CIRCUITS	9 Hrs

Basic memory structure – ROM – PROM – EPROM – EEPROM – EAPROM. RAM – Static and dynamic RAM – Programmable Logic Devices – Programmable Logic Array(PLA) – Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FGPA) – Implementation of combinational logic circuits using PLA, PAL. Digital integrated circuits: Logic levels, propagation delay, power dissipation, fan-out and fan-in, noise margin, logic families and their characteristics- RTL,TTL, ECL, CMOS.

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the functions of a digital circuit (Understand)
- Apply simplification techniques to design minimized logic circuits. (Apply)
- Analyze synchronous and asynchronous sequential circuits to provide solutions for engineering problems. (Analyze)
- Evaluate the design of a digital circuit using the fundamental concepts. (Evaluate)
- Develop a digital system for a real time application to meet the functional requirements. (Create)
- Communicate the purpose and result of a design project in written and oral presentation. (Affective Domain)

TEXT BOOKS:

1. M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 4th Edition,2016.
2. A.Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
3. R.P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

REFERENCE BOOKS:

1. Leach D ,Malvino A P &Saha, " Digital Principles and Applications", 8th Edition, Tata McGraw – Hill Publishing Company, 2014.
2. Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education, New Delhi, 2009.
3. John M Yarbrough, "Digital Logic Applications and Design", Thomson – Vikas Publishing House, New Delhi,2002.
4. W H Gothman, "Digital Electronics: An introduction to theory and practice", 2nd Edition, Prentice Hall of India, 2000.
5. A.P.Godse&D.A.Godse, "Digital Electronics", Technical Publications, 2017.

WEB REFERENCES:

1. Digital System Design URL:http://nptel.ac.in/courses/117105080
2. Introductionto Digital Circuits and Systems URL:http://nptel.ac.in/video.php/subjectId = 117106086
3. DigitalLogicURL:http://freevideolectures.com/Course/2319/Digital-Systems-Design/3.

19UCS304	OBJECT ORIENTED PROGRAMMING USING JAVA	L	T	P	C
		3	0	0	3

PRE-REQUISITE: Have studied at least one programming language in earlier semesters

COURSE OBJECTIVES :

- To impart object oriented programming principles to students
- To demonstrate java programming language principles to develop application programs.
- To enable students to create GUI based applications in Java programming language.
- To enable students to establish database connectivity from Java.

UNIT I	CLASSES AND OBJECTS	9 Hrs

Procedural and Object Oriented languages - Object Oriented principles - Features of Java - Real time applications developed in Java - Java Ecosystem: JDK - JRE - JVM - Running a Java Program - Defining a class and creating objects - Constructors - Access control - static keyword - arrays - strings - inner class - package.

UNIT II	POLYMORPHISM, INHERITANCE AND ABSTRACTION	9 Hrs

Polymorphism - method overload - constructor overload - Inheritance: Definition - Super class - Sub class - types - method override - Constructors and Inheritance - super keyword - final keyword - dynamic polymorphism - Interfaces: Definition - simple interface - multiple interface - extending interface - nested interface - Abstract class

UNIT III	GENERICS AND COLLECTIONS	9 Hrs

Generics: Definition - Generic method - Generic Class - Bounded Types - Collections: Definition - Hierarchy of collections - Collection interface - Array List class - Iterator interface - Stack class - Queue interface - Priority Queue - Deque interface - LinkedList class

UNIT IV	EXCEPTION HANDLING AND I/O STREAMS	9 Hrs

Exception Handling: Definition - Exception Hierarchy - try - throw - catch paradigm - finally - handling multiple exceptions I/O streams: InputStream and OutputStream - Reader and Writer - Reading and Writing files

UNIT V	EVENT HANDLING AND GRAPHICAL USER INTERFACE	9 Hrs

Introduction to JavaFX - JavaFX Architecture - Application Structure - Layouts - UI controls: Label, Button, RadioButton, CheckBox, TextField, PasswordField, Slider, ScrollBar, FileChooser, Menu - Event Handling: Convenience methods - Event Handlers

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Define classes with access controls to create objects for real world scenarios. (Apply)
- Construct hierarchy of classes to create objects for complex scenarios. (Apply)
- Apply partial and fully abstractions in class design for complex problems. (Apply)

- Use Collections framework to construct various data structures to process the input of a computing solution. (Apply)
- Utilize I/O streams in Java to store, retrieve, and access data into and from files. (Apply)
- Develop GUI interfaces for interactive window applications. (Create)

TEXT BOOKS:

1. Herbert Schildt, and Dale Skrien, “Java Fundamentals – A Comprehensive Introduction”, Tata McGraw Hill Education Private Limited, Special Indian Edition, 2013.

REFERENCE BOOKS:

1. Paul J. Deitel, and Harvey M. Deitel, “Java for Programmers”, Pearson Education,2nd Edition, 2012.
2. Cay Horstmann, and Gary Cornell, “Core Java Volume - I Fundamentals”, Prentice Hall, 9th Edition, 2011.
3. Herbert Schildt, “The Complete Reference JAVA 2” , Tata McGraw Hill, 5th Edition, 2002.
4.Oracle Java Documentation, "The Java Tutorials", https:// docs.oracle.com/ javase/tutorial/ index.html.
5. https://www.javatpoint.com/javafx-tutorial

19UCS305	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

The student should be made to:

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.

UNIT I	INTRODUCTION	9 Hrs

Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

UNIT II	PROCESS MANAGEMENT	9 Hrs

Process Management – Process concept, The process, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

UNIT III	MEMORY MANAGEMENT AND VIRTUAL MEMORY	9 Hrs

Memory Management: Swapping, Contiguous Memory Allocation, Paging, the structure of the Page Table, Segmentation

Virtual Memory Management: Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

UNIT IV	CONCURRENCY CONTROL	9 Hrs

Concurrency: Process Synchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization

examples Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock

UNIT V	FILE SYSTEM	9 Hrs

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the basic concepts of operating systems. **(Understand)**
- Apply various methods to solve problems relevant to process and scheduling. **(Apply)**
- Incorporate various techniques in allocating memory for different processes. **(Apply)**
- Apply various methods to solve problems relevant to deadlock. **(Apply)**
- Analyze the performance of various algorithms related to operating system to find the optimal solution for a real world application **(Analyze)**
- Work individually or in teams and communicate effectively to justify the various operating system concepts. **(Affective domain)**

TEXT BOOKS:

1. Silberschatz, Galvin, and Gagne, “Operating System Concepts”, Sixth Edition, Wiley India Pvt Ltd, 2003.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Pearson Education, 2004.

2. Gary Nutt, “Operating Systems”, Third Edition, Pearson Education, 2004. 3. Harvey M. Deital, “Operating Systems”, Third Edition, Pearson Education, 2004.

19UCS306	COMPUTER ORGANIZATION	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To familiarize the components of computer system and instructions
- To discuss in detail the operation of the arithmetic unit.
- To design pipelining and parallel processing architecture

- To give knowledge on memory and I/O systems

UNIT I	OVERVIEW AND INSTRUCTIONS	9 Hrs

Components of a computer system – Basic Operational Concepts – Operations and Operands – Representing instructions – Logical Operations – Control Operations – Instruction and Instruction Sequencing – Addressing and Addressing modes.

UNIT II	ARITHMETIC OPERATIONS	9 Hrs

Addition and Subtraction of signed numbers – Multiplication of unsigned and signed numbers – Fast Multiplication – Integer division – Floating point numbers and operations – ALU – Data path and Control Unit.

UNIT III	PIPELINING & PARALLEL PROCESSORS	9 Hrs

Pipelining – Instruction and Arithmetic Pipeline – Data hazards – Instruction hazards – Superscalar operation.

Parallel processors: Introduction to parallel processors, Concurrent access to memory and cache coherency

UNIT IV	MEMORY CONCEPTS	9 Hrs

Memory hierarchy - Memory technologies – Cache basics – Measuring and improving cache performance - Virtual memory, TLBs- Memory Management Requirements

UNIT V	I/O SYSTEMS	9 Hrs

Input/output system-Accessing I/O Devices – Interrupts – Direct Memory Access – Bus Structure – Bus Operation – Arbitration – Interface Circuits – USB

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the functional units and components of a computer system. (Understand)
- Apply the principles of computing to identify solutions for complex computing problems. (Apply)
- Analyze the design issues in terms of speed, technology, and cost to improve the performance of CPU. (Analyze)
- Analyze the technologies used to measure and improve the cache performance. (Analyze)
- Design a processor considering the performance issues of memory and CPU. (Create)
- Work individually or in teams and communicate effectively to justify the computing practice based on legal and ethical principles. (Affective domain)

TEXT BOOKS:

1. Carl Hamacher, ZvonkoVranesic and SafwatZaky, “Computer Organization”, Fifth

Edition, Tata McGraw Hill, 2002.

2. David A. Patterson and John L. Hennessey, “Computer organization and design the hardware / software interface”, Morgan Kauffman / Elsevier, Fifth edition, 2014.

REFERENCE BOOKS:

1. William Stallings “Computer Organization and Architecture” , Seventh Edition , Pearson Education, 2006.
2. Vincent P. Heuring, Harry F. Jordan, “Computer System Architecture”, Second Edition, Pearson Education, 2005.
3. Govindarajalu,“Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2005.
4. John P. Hayes, “Computer Architecture and Organization”, Third Edition, Tata McGraw Hill, 1998.

19UCS307	SEMINAR	L	T	P	C
		0	0	2	1

PRE-REQUISITE :

Seminar provides an opportunity for the students to express his technical ideas orally through presentation. The seminar facilitates to develop communication skills, the ability to prepare and present technical ideas with clarity of expression, and the ability to analyse the technical ideas critically. The students will be evaluated based on their scientific and technical knowledge, preparation and organization of the presentation, language, manners and style of presentation, clarity of expression, adequacy and use of required tools and references, confidence, attitude and time management. Suitable rubrics will be formed to evaluate the seminar presentation by the Course handling faculty in consultation with the HoD and the general guidelines given by the Principal

TOTAL:30Periods.

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Identify, and discuss current, real-world issues related to computer science and engineering.(Affective Domain)
- Communicate effectively on Complex computer science and engineering activities with the engineering community. (Affective Domain)
- Apply principles of ethics in interaction with others.(Affective Domain)

19UCS308	DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	3	1.5

PRE-REQUISITE :

COURSE OBJECTIVES:

- To demonstrate linear and non-linear data structures.
- To implement searching, sorting and hashing algorithms.

LIST OF EXPERIMENTS

1. Create a list with n nodes. Each node contains height and weight of the person.
   i. Insert the node based on the sorted order of weight.
   ii. Delete the specified node(s) based on height information and display the resultant list.
2. Represent a polynomial as a linked list and write functions to add and multiply the following polynomial and display the resultant polynomial.
   $4X^4+3X^3+X+5$, $3X^3+2X^2+X+3$.
3. The Monk is trying to explain to its users that even a single unit of time can be extremely important and to demonstrate this particular fact he gives them a challenging task. There are **N** processes to be completed. All the processes have a unique number assigned to them from **1 to N**. Now, you are given two things:
   i. The **calling** order in which all the processes are called.
   ii. The **ideal** order in which all the processes should have been executed.

   Now, let us demonstrate this by an example. Let's say that there are **3 processes**, the calling order of the processes is: **3 - 2 - 1.** The ideal order is: **1 - 3 - 2,** i.e., process number 3 will only be executed after process number 1 has been completed; process number 2 will only be executed after process number 3 has been executed.

   i. *Iteration #1:* Since the ideal order has process #1 to be executed firstly, the calling ordered is changed, i.e., the first element has to be pushed to the last place. Changing the position of the element takes 1 unit of time. The new calling order is: 2 - 1 - 3. Time taken in step #1: 1.
   ii. *Iteration #2:* Since the ideal order has process #1 to be executed firstly, the calling ordered has to be changed again, i.e., the first element has to be pushed to the last place. The new calling order is: 1 - 3 - 2. Time taken in step #2: 1.
   iii. *Iteration #3:* Since the first element of the calling order is same as the ideal order, that process will be executed. And it will be thus popped out. Time taken in step #3: 1.
   iv. *Iteration #4:* Since the new first element of the calling order is same as the ideal order, that process will be executed. Time taken in step #4: 1.
   v. *Iteration #5:* Since the last element of the calling order is same as the ideal order, that process will be executed. Time taken in step #5: 1.
   Total time taken: 5 units.
   PS: Executing a process takes 1 unit of time. Changing the position takes 1 unit of time.
   Inputformat:
   The first line a number **N**, denoting the number of processes. The second

line contains the calling order of the processes. The third line contains the ideal order of the processes.

Outputformat:

Print the total time taken for the entire queue of processes to be executed.

4. Write a program to check a sequence of brackets is balanced if the following conditions are met:
   i. It contains no unmatched brackets.
   ii. The subset of brackets enclosed within the confines of a matched pair of brackets is also a matched pair of brackets.
   iii. Given n strings of brackets, determine whether each sequence of brackets is balanced. If a string is balanced, return YES. Otherwise, return NO.

   INPUT:

   The first line contains a single integer n, the number of strings.
   Each of the next n lines contains a single string s, a sequence of brackets.

   CONSTRAINTS:

   1<=n<=10^3
   1<=|s|<=10^3, where is the length of the sequence.
   All characters in the sequences? { {, }, (,), [,] }.
5. Implement basic binary search tree operations. While deleting the node with two children, replace it with either in -order successor or in -order predecessor based on choice.
6. Write a program to implement an expression tree. Produce its pre -order, in-order, and post-order traversals.
7. An array **A** of size **N is given. P**erform an operation in which remove the largest and the smallest element from the array and add their difference back into the array. So, the size of the array will decrease by **1** after each operation. Input the Q tasks, For each task, print the sum of all the elements in the array.
8. The ABC Company has its branches in several cities in India. The company wants to lease phone lines to connect them up with each other; and the phone company charges different amounts of money to connect different pairs of cities. They want to connect all the branches with a minimum total cost. Help them to fix their problem.
9. The XYZ Parcel service wants to deliver a package from Madurai to Trivandrum, Bangalore, Hyderabad, Bombay, New Delhi and kolkata through rail. The train fare between each pair of cities varies. The XYZ Parcel service wants to cut down on the total distance traveled to save transport charge and it wants to know the route with minimum distance from Madurai to all other cities. Help them to find the route.
10. Implement hashing with open addressing. Resolve the collision with
    i. Linear probing
    ii. Quadratic probing
11. Write a program to arrange the names of the students in the class using Bubble sort and Insertion sort as well as print the number of comparisons made by each algorithm.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply linked list concepts to provide solution for computing problems. (Apply)
- Make use of Stack and queue for solving computing problems. (Apply)

- Experiment with Binary tree and Expression tree. (Apply)
- Design solutions for computer applied real world complex engineering problems using graph algorithms. (Create)
- Apply the knowledge of sorting to organize the data. (Apply)
- Apply the knowledge of hashing for data indexing. (Apply)

HARDWARE AND SOFTWARE REQUIRMENTS

HARDWARE REQUIREWMENTS:

Personal Computers – 30 Numbers

SOFTWARE REQUIREMENTS:

Operating System: Linux (any flavor) / Windows

Any C++ compiler compatible with Linux / Windows

19UCS309	JAVA PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	1.5

PRE-REQUISITE :

Have studied one programming laboratory in early semesters.

COURSE OBJECTIVES:

- To enable students to understand Integrated Development Environment (IDE) to work with Java
- To enable students to write object oriented programs in Java
- To enable students to develop Graphical User Interfaces
- To enable students to manipulate data stored in a database

LIST OF EXPERIMENTS

1. Write a java program to illustrate constructors.
2. Write a java program to demonstrate arrays and strings.
3. Write a java program to implement inheritance
4. Write a java program to demonstrate interface.
5. Write a java program to illustrate exception handling.
6. Write a java program to demonstrate generic programming
7. Write a java program to use collection.
8. Write a java program to perform File I/O.
9. Write a java program to design Forms using FX.
10. Write a java program to demonstrate Dialogs.

TOTAL : 30 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Develop programming solutions to real world problems using object oriented concepts. (Apply)
- Use Exception handling and generic programming in solutions to problems. (Apply)
- Employ Collections and File I/O to solve problems. (Apply)
- Design GUI based applications(Create)

HARDWARE AND SOFTWARE REQUIRMENTS

HARDWARE REQUIREWMENTS:

Personal Computers – 30 Numbers

SOFTWARE REQUIREMENTS:

Operating System: Linux (any flavor) / Windows

JDK version above 6, any IDE like NetBeans, Eclipse, Code etc.

19UCS310	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	3	1.5

PRE-REQUISITE :

COURSE OBJECTIVES:

The student should be made to:

- Study the working concepts of CPU scheduling
- Understand various file allocation strategy
- Learn various file organization techniques
- Understand the resource allocation concepts relevant to deadlock
- Implement page replacement algorithms
- Solve problem relevant to memory management

LIST OF EXPERIMENTS

1. Simulation of FCFS scheduling algorithm.
2. Simulation of SJF scheduling algorithm.
3. Simulation of Priority scheduling algorithm.
4. Simulation of Round Robin scheduling algorithm.
5. Implementation of file allocation strategy.

a) Sequential b) Indexed c) Linked

6. Simulate all File Organization Techniques I

a) Single level directory b) Two level

7. Simulate all File Organization Techniques II

a) Hierarchical b) DAG

8. Simulation of dining philosopher problem.
9. Simulate Bankers Algorithm for Dead Lock Avoidance
10. Simulate Bankers Algorithm for Dead Lock Prevention
11. Simulate all page replacement algorithms

a) FIFO b) LRU c) LFU Etc. …

12. Simulate Paging Technique of memory management.
13. Simulate disk scheduling algorithms I

a) FCFS b) SSTF

14. Simulate disk scheduling algorithms II

a) SCAN b) LOOK

15. Simulate Segmentation Technique of memory management.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the knowledge of CPU scheduling to solve problems relevant to multi

process.(Apply)
- Employ various file allocation strategies to simulate in the operating systems (Apply)
- Deploy various file organization techniques in the operating system (Apply)
- Build solutions to the resource allocation problem which leads to deadlock (Apply)
- Simulate various techniques implements to page replacement algorithms (Apply)
- Provide solutions to the problems relevant to memory management (Apply)

HARDWARE AND SOFTWARE REQUIRMENTS

HARDWARE REQUIREWMENTS:

Personal Computers – 30 Numbers

SOFTWARE REQUIREMENTS:

Operating System: Linux (any flavor) / Windows

Any C++ compiler compatible with Linux / Windows

SEMESTER-IV

Semester IV

Course Code		Course Title	L	T	P	C
THEORY						
19UMA421	BS	Transforms and Discrete Mathematics (Common to CSE &IT)	3	1	0	4
19UCS402	PC	Computer Communications and Networks	3	0	0	3
19UCS403	PC	Design and Analysis of Algorithms	3	1	0	4
19UCS404	PC	Database System Concepts	3	0	0	3
19UEC425	ES	Microprocessors and Microcontrollers	3	0	0	3
PRACTICAL						
19UEC426	ES	Microprocessors and Microcontrollers Laboratory	0	0	3	1.5
19UCS407	PC	Computer Communications and Networks Laboratory	0	0	3	1.5
19UCS408	PC	Database System Concepts Laboratory	0	0	3	1.5
MANDATORY COURSES						
19UGM431	MC	Gender Equality	1	0	0	P/F
19UGM432	MC	Basics of Biology for Engineering	2	0	0	P/F
		TOTAL	**18**	**2**	**9**	**21.5**
Total No. of Credits – 21.5						

19UMA421	TRANSFORMS AND DISCRETE MATHEMATICS (COMMON TO CSE & IT)	L	T	P	C
		3	1	0	4

PRE-REQUISITE:

COURSE OBJECTIVES :

- To make the student acquire sound knowledge to test the logic of program.
- To familiarize the student to be aware of generating functions.
- To acquaint the student with the basics of Z - transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of difference equations and solve them using the Z - transform technique bringing out the elegance of the procedure involved

UNIT I	LOGIC AND PROOF METHODS	9+3 Hrs

Propositional Logic – Propositional equivalences - Predicates and quantifiers – Nested Quantifiers - Rules of inference - Introduction to Proofs - Proof Methods and Strategy.

UNIT II	COMBINATORICS	9+3 Hrs

Permutations and Combinations - Mathematical inductions - Strong induction and well ordering - The basics of counting – The pigeonhole Principle – Recurrence relations – Solving Linear recurrence relations - Generating functions - Inclusion and exclusion and applications.

UNIT III	ALGEBRAIC STRUCTURES	9+3 Hrs

Algebraic systems - Semi groups and Monoids – Groups - Subgroups and Homomorphisms - Cosets and Lagrange's theorem - Ring & Fields – Vector Spaces (Definitions and examples).

UNIT IV	FOURIER TRANSFORM	9+3 Hrs

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity - Application of Fourier Transform

UNIT V	Z-TRANSFORM AND DIFFERENCE EQUATIONS	9+3 Hrs

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and Final value Theorems - Formation of difference equations – Solution of difference equations.

TOTAL : 45 (L) + 15 (T) = 60 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply logical structure of proofs and work symbolically with connections and quantifiers to produce logical value, correct and clear argument. (Apply)
- Apply the knowledge of induction hypotheses and the principle of basic counting , pigeonhole principle and solving, linear Recurrence relations, generating functions. (Apply)
- Apply the knowledge of set with the operations for groups, rings and fields using elementary properties if necessary. (Apply)
- Apply the acquired knowledge of Fourier transform and its properties which are used to transform signals between time and frequency domain. (Apply)
- Apply the acquired knowledge of Z transform and its properties inverse Z transform and difference equations. (Apply)
- Understand the knowledge of principle of counting, continuous and discrete transforms.(Understand)

TEXT BOOKS:

1. KENNETH H.ROSEN, “Discrete Mathematics and its Applications”, Special Indian Edition, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 5th Edition, (2008).
2. TREMBLY J.P and MANOHAR R, “Discrete Mathematical Structures with Applications to Computer Science”, Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 35th Re-print, (2008).
3. VEERAJAN.T, “Engineering Mathematics for semester III”, Tata McGraw-Hill,New Delhi (2000).

REFERENCE BOOKS:

1. RALPH. P. GRIMALDI, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Pearson Education, New Delhi, 4th Edition, (2002).
2. TAMILARASI.A, and NATARAJAN.A.M, “Discrete Mathematics and its Applications”, Khanna Publishers, New Delhi, 3rd Edition, (2008).
3. SEYMOUR LIPSCHUTZ and MARK LIPSON, “Discrete Mathematics”, Schaum’s Outlines, Tata McGraw-Hill, New Delhi, 2nd Edition, (2007).
4. VEERARAJAN, T. “Discrete Mathematics with Graph Theory and Combinatorics”, Tata McGraw-Hill, New Delhi, 7th Edition, (2008).

5. KANDASAMY.P, THILAGAVATHY.K, and GUNAVATHY.K, Engineering Mathematics III, Chand & Company Ltd., New Delhi, 3rd Edition, (1996).

19UCS402	COMPUTER COMMUNICATIONS AND NETWORKS	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To impart the knowledge about the principles of data communication
- To understand the layering concepts in computer networks
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the transport layer
- To acquire the knowledge on applications of networks

UNIT I	INTRODUCTION AND PHYSICAL LAYER	9Hrs

Data Communication- Networks-Protocols and Standards –Layered Tasks – The OSI Model – Layers-TCP/IP Protocol Suite- Addressing – Performance- multiplexing –Spread Spectrum- Transmission Media- Switching.

UNIT II	DATA LINK LAYER AND MEDIA ACCESS CONTROL	9Hrs

Error Detection and Error Correction –Data Link Control - Multiple access Protocols- Wired LANs- Ethernet –Wireless LAN- IEEE 802.11 –Bluetooth – Connecting Devices- wireless WAN – Virtual Circuit Networks.

UNIT III	NETWORK LAYER	9Hrs

Network Layer Services - packet switching – Logical Addressing- Internet Protocols (IPV4 and IPv6)– Address Mapping – Network Layer Protocols: ICMP – IGMP – ICMP v6 – Delivery- Forwarding –Unicast Routing Protocol– Multicast Routing Protocol

UNIT IV	TRANSPORT LAYER	9Hrs

Process to Process Communication-UDP_TCP_SCTP- Congestion Control- QoS improving techniques- RPC

UNIT V	APPLICATION LAYER	9Hrs

DNS, DDNS, TELNET, EMAIL – (POP, SMTP), FTP, WWW, HTTP, SNMP, Basic concepts of Cryptography and digital signature – Firewalls.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Describe about the basic layers and its functions in computer networks.(Understand)
- Apply the knowledge of error detection and correction techniques for error free data flow in a computing Environment.(Apply)
- Identify suitable routing algorithm to transmit the data efficiently in a network Environment. (Analyze)
- Apply the knowledge of congestion control mechanisms to the solution of problems involving the improvement of QoS.(Apply)
- Illustrate the working of various application layer protocols.(Apply)
- Design a LAN network and estimate their performances. (Create)

TEXT BOOKS:

1. Behrouz A. Forouzan, “Data Communications and Networking”, Fifth Edition TMH, 2013.
2. Andrew S Tanenbaum, “Computer Networks”, PHI, 2010.
3. Walliam Stallings , “Data and Computer Communications”, PHI,2002

REFERENCE BOOKS:

1. James F. Kuross, Keith W. Ross, “Computer Networking, A Top-Down Approach Featuring the Internet”, Addison Wesley, Third Edition, 2004.
2. Nader F. Mir, “Computer and Communication Networks”, Pearson Education, 2007.
3. Comer, “Computer Networks and Internets with Internet Applications”, Pearson Education, Fourth Edition, 2007.
4. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.

19UCS403	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	1	0	4

PRE-REQUISITE: DATA STRUCTURES

COURSE OBJECTIVES :

- To give knowledge on algorithm analysis techniques
- To demonstrate a familiarity with major algorithms and data structures.
- To apply important algorithmic design paradigms and methods of analysis.
- To summarize the limitations of Algorithm power.

UNIT I	INTRODUCTION TO ANALYSIS OF ALGORITHMS	(9+3) 12 Hrs

Notion of an Algorithm–Fundamentals of Algorithmic Problem Solving–Fundamentals of the Analysis of Algorithm Efficiency– Analysis Framework– Asymptotic Notations and its properties– Mathematical analysis for Recursive and Non-recursive algorithm.

UNIT II	BRUTE FORCE, DIVIDE AND CONQUER, DYNAMIC PROGRAMMING, TECHNIQUES	(9+3) 12 Hrs

Brute Force–Bubble Sort - Sequential Search - Divide and conquer methodology– Merge sort– Quick sort– Binary search- Find maximum and minimum element. Dynamic Programming- Warshall's and Floyd'salgorithm– Optimal Binary Search Tree- Knapsack Problem.

UNIT III	GREEDY TECHNIQUE AND ITERATIVE IMPROVEMENT TECHNIQUES	(9+3) 12 Hrs

Greedy Technique–Job sequencing with deadlines – Minimum Spanning Trees – Huffman Trees. Iterative Improvement- The Simplex Method-The Maximum Flow Problem–Maximum Matching in Bipartite Graphs- The Stable marriage Problem.

UNIT IV	NP HARD AND NP COMPLETE PROBLEMS	(9+3) 12 Hrs

Limitations of Algorithm Power-Lower Bound Arguments- P – NP – Polynomial Time Reductions – NP Complete – NP Hard – Examples of NP Hard and NP Complete Problems - Cook's Theorem - Coping with the Limitations

UNIT V	BACKTRACKING, BRANCH AND BOUND TECHNIQUES	(9+3) 12 Hrs

Backtracking – n-Queens problem – Hamiltonian Circuit Problem– Subset Sum Problem- Graph Coloring; Branch and Bound– Assignment problem–Knapsack Problem – Traveling Salesman Problem.

TOTAL:45(L)+15(T)= 60 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Compute and analyze the time complexity of recursive and non-recursive algorithms. (Analyze)
- Develop algorithms to solve problems using brute force and divide and conquer techniques and analyze the time complexity of it. (Analyze)
- Derive algorithm using dynamic programming technique to solve problems. (Apply)
- Construct algorithm to solve problem using Greedy and Iterative techniques.(Apply)
- Employ algorithm design techniques to solve NP problems using backtracking and branch and bound technique. (Apply)
- Adapt the best suitable algorithmic technique to solve real world problems on evaluating the performance of various algorithmic techniques. (Create)

TEXT BOOKS:

1. .AnanyLevitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition,Pearson Education, 2012.

2. S. Sridhar, “Design and Analysis of Algorithms”, Oxford University Press, 2015.

REFERENCE BOOKS:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein,“Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.

2. Sara Baase and Allen Van Gelder, “Computer Algorithms-Introduction to design andAnalysis”,Pearson Education Asia,2003.

3. A.V.Aho,J.E.Hopcroft and J.D.Ullman, “The Design and Analysis Of ComputerAlgorithms”,Pearson Education Asia,2003

4. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”,Pearson Education, Reprint 2006.

19UCS404	DATABASE SYSTEM CONCEPTS	L	T	P	C
		3	0	0	3

PRE-REQUISITE: Introduction Computer Science and Engineering

COURSE OBJECTIVES :

- To impart the knowledge in Relational Database Management Systems.
- To inculcate knowledge Normalization techniques.
- To familiarize in transaction management.

- To understand the storage and retrieval mechanisms in Databases.
- To learn query optimization techniques.
- To gain knowledge in advanced databases.

UNIT I	RELATIONAL DATABSES	9

Purpose of Database System – Views of data – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL – Embedded SQL – Dynamic SQL

UNIT II	DATABASE DESIGN	9

Entity-Relationship model – ER Diagrams – Enhanced ER Model – ER to Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce-Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT III	TRANSACTION PROCESSING AND CONCURRENCY CONTROL	9

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery - Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery

UNIT IV	IMPLEMENTATION TECHNIQUES	9

RAID – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation

UNIT V	ADVANCED TOPICS	9

Database Security: Authentication, Authorization and access control, DAC, MAC andRBAC models, Intrusion Detection-Object oriented and object relational databases - Web databases - Distributed databases–Parallel Databases-Temporal Databases- Spatial Databases.

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the basic as well as advanced concepts of DBMS. (Understand)
- Apply the concepts of DBMS to find solutions to a broad range of queries (Apply)
- Analyze various database design techniques to develop a database application for a given scenario. (Analyze)
- Evaluate various storage and query evaluation plans to optimize query cost (Evaluate)
- Design Database for a given real life scenario using the concepts of Relational model and ER diagrams (Create)
- Work individually or in teams and demonstrate the solutions to the given exercises through presentation (Affective Domain)

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, “Database System Concepts”, McGraw Hill Education (India) Private Limited, Sixth Edition, 2013

REFERENCE BOOKS:

1. RamezElmasri and ShamkantB.Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education, 2008.
2. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, Tata McGraw Hill, 2010.
3. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Pearson Education, Eighth Edition, 2006.
4. AtulKahate, “Introduction to Database Management Systems”, Pearson Education, New Delhi, 2006.
5. Alexis Leon and Mathews Leon, “Database Management Systems”, Vikas Publishing House Private Limited, New Delhi, 2003.

19UEC425	MICROPROCESSOR AND MICROCONTROLLERS	L	T	P	C
		3	0	0	3
PRE-REQUISITE:					
COURSE OBJECTIVES :					

- To develop an in-depth understanding of the operation of microprocessors and Microcontrollers, assembly language programming & interfacing techniques
- To introduce the hardware architecture, instruction set, programming of 8051 microcontroller and Advanced microcontroller

UNIT I	8086 MICROPROCESSOR ARCHITECTURE AND PROGRAMMING	9Hrs

Introduction to Microprocessor - 8086 Microprocessor architecture – Signals – Maximum & Minimum mode Configuration - Addressing modes - Instruction set and assembler directives – Assembly Language Programming –Procedures – Macros – Interrupts and interrupt service routines

UNIT II	PERIPHERAL INTERFACING	9Hrs

Memory interfacing and I/O interfacing - Serial Communication Interface (8251)- parallel port Interface (8255) - Keyboard and Display controller (8279) – Programmable Interval Timer(8253/8254) – Programmable Interrupt Controller(8259) - DMA Controller(8237).

UNIT III	8051 MICROCONTROLLER ARCHITECTURE AND PROGRAMMING	9Hrs

8051 Architecture– Memory organization - Special Function Registers (SFRs) - I/O Pins / Ports – Instruction sets and Addressing modes - 8051 Modes and Programming – Timer, Interrupts, Serial ports- Assembly Language Programming

UNIT IV	8051 INTERFACING AND APPLICATIONS	9Hrs

8051 Interfacing: LCD & Keyboard interfacing - ADC, DAC & Sensor interfacing, External Memory Interfacing - Stepper Motor and Wave form generation-Traffic light controller.

UNIT V	ADVANCE MICROCONTROLLER	9Hrs

Introduction to Arduino –AVR Atmega8 Microcontroller Architecture –Pin Configuration – Instruction set- Addressing modes – Programming- Case Study: DC Motor Controller and Real time clock- PIC16f877a Architecture- Difference between Arduino and PIC microcontroller.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the knowledge of 8086 processor to design and develop code for appropriate applications.(Apply)
- Analyze the various interfacing techniques to develop real time applications. (Analyze)
- Apply the knowledge of 8051 micro controller to design and develop code for appropriate applications. (Apply)
- Analyze the various interfacing techniques to develop Microcontroller based real time Application.(Analyze)

- Develop code for real time control applications using Arduino Microcontroller.(Apply)

TEXT BOOKS:

1. Douglas V Hall, "Microprocessors and Interfacing, Programming and Hardware",Tata McGraw Hill,2006.
2. Kenneth J Ayala, "The 8051 Microcontroller Architecture Programming and Application" , Penram International Publishers (India), 2nd Edition,1996
3. Mazidi M. A., McKinlay R. D., Causey D "PIC Microcontroller And Embedded Systems", Pearson Education International, 2008

REFERENCE BOOKS:

1. Ramesh S Gaonkar, "Microprocessor Architecture, Programming and Application with 8085", Penram International Publishing, 4th Edition, New Delhi, 2000
2. Krishna Kant, "Microprocessors and Microcontrollers Architecture, programming and system design using 8085, 8086, 8051 and 8096", PHI, 2007
3. Mohammed Ali Mazidi and Janice GillispieMazidi,"The 8051 Microcontroller and Embedded Systems" ,Pearson Education Asia, New Delhi, 2003
4. Ajay V Deshmukh , "Microcontrollers : Theory and Applications", Tata McGraw-Hill Education, 2005

19UCS407	COMPUTER COMMUNICATIONS AND NETWORKS LABORATORY	L	T	P	C
		0	0	3	1.5

PRE-REQUISITE :

COURSE OBJECTIVES:

- To learn and use network commands
- To learn socket programming
- To implement remote procedure call
- To learn and use simulation tools to implement and analyze the performance of network routing protocol.

LIST OF EXPERIMENTS

1. Implementation of CRC and Hamming Code generation(CO1)
2. Implementation of Stop and Wait Protocol(CO2)
3. Implementation of Sliding Window Protocol(CO2)
4. Implementation of Distance Vector Routing Protocol and Link State Vector Routing Protocol(CO2)
5. Program using TCP Socket(CO3)

(i) data and time Server & client

(ii) echo Server & Client

(iii) File Transfer

(iv) Web page Upload and Download

6. Implementation of DNS using UDP socket(CO3)
7. Implementation of ARP/RARP(CO3)
8. Implementation of RPC(CO3)
9. Implementation of Data Encryption and Decryption(CO4)
10. Performance evaluation of Routing Protocols using Simulation tool.(CO3)

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Design solutions using error detection and correction techniques to improve QoS.(Apply)
- Design solutions using routing algorithms to transfer the data efficiently (Apply)
- Design solutions for secured message transfer.(Apply)
- Design LAN configuraton using simulation. (Create)

HARDWARE AND SOFTWARE REQUIRMENTS

HARDWARE REQUIREWMENTS:

Desktops – 30Nos

SOFTWAREREQUIREWMENTS:

1. C++ Compiler,J2SDK(Freeware),
2. Network Simulators, NS2/Glomosim/OPNET (Freeware)

19UCS408	DATABASE SYSTEM CONCEPTS LABORATORY	L	T	P	C
		0	0	3	1.5
PRE-REQUISITE : Introduction Computer Science and Engineering					

COURSE OBJECTIVES:

- To demonstrate the creation and usage of database

LIST OF EXPERIMENTS

1. Vijay TV Company wishes to develop a database to store data about the TV series that the companyproduces.Thedataincludesinformationaboutactorswhoplayintheseries,anddirectors who direct the episodes of theseries. Actors and directors are employed by the company. A TV series are divided into episodes. Each episode may be transmitted at several occasions. An actor is hired to participate in a series, but may participate in many series. Each episode of a series is directed by one of the directors, but different episodes may be directed by different directors.
   Create tables with necessary integrity constraints. Insert minimum of 10 records in each table.

2. A departmental store has many sections such as Toys, Cosmetics, Clothing, Household Items, and Electronics etc. Each section has many employees. Employees can belong to only one section. In addition, each section also has a head that is responsible for the section s performance.
   The department store also has many customers who purchase goods from various sections. Customers can be of two types Regular and Ad-hoc. Regular customers get credit at the department store. Maximum credit limit allowed is Rs.10000.
   The store procures goods from various suppliers. The goods are stored in a warehouse and transferred to the store as and when requirement comes up. Quantity of goods supplied cannot be less than 0 and cannot be greater than 10000 for a particular supply. The store has a computerized system for all its operations.
   Create the tables with all appropriate constraints. Use the constraints UNIQUE, NOT NULL, CHECK, PRIMARY KEY, FOREIGN KEY etc. wherever necessary.

3. Solve the following queries using the database created in Ex.1:
   i. Which actors play in the series ‘Rajarani’?
   ii. In which series does the actor ‘Rio’participate?
   iii. Which actors participate in more than oneseries?
   iv. How many times has the first episode of the series ‘SaravananMeenakshi’ been transmitted? At whattimes?
   v. How many directors are employed by thecompany?
   vi. Which director has directed the greatest number of episodes?

4. Solve the following queries using the database created in Ex.2:
   i. Find all employees whose names begin with A and end with A.
   ii. Find all products whose descriptions have the characters me.
   iii. Find the total salary paid by each section to employees.
   iv. Display the section names and the names of the employees who belong to that section.
   v. Display the section name and the name of the person who heads the section.
   vi. Display supplier names and cities. If the city is null, display LOCAL.
   vii. Display the customer names and the customer type. If the customer type is R, display as ‘Regular’.If the customer type is A, display ‘Ad-hoc’.

5. A municipality needs a database containing information concerning the inhabitants of the municipality. The database will be used for the planning of schools, health care and child care. From the database, you should be able to receive answers to queries of the following types: (Use library functions and aggregate functions)
    i. How many boys and girls will start school during year *x*?
    ii. How many people will become old-age pensioners during year *x*?
    iii. How many households have more than *x* people?
    iv. How many people are single parents?
    v. In how many households is at least one member unemployed?
    vi. How many households have a total income that is less than the norm for receiving social benefits?

6. A medical health research project has a database containing data about all patients at ahospital. For each patient, data about the symptoms that the patient shows is registered:fever, headache, cough, chest pains, . . . Symptoms can have different severity: low, middle,or high. A patient may show several symptoms, e.g., high fever, medium headache andsomecough.The database also contains data about diseases. Each disease is characterized bydifferent symptoms: a patient with a cold should have fever and a cough, a malaria patientshould have fever and fits of shivering, etc.
   Write SQL statements that answer the following questions (define and use views). Find the names of all patients that:
    i. don't have any symptom of high severity,
    ii. have at least two different symptoms,
    iii. have at least one of the symptoms of malaria
    iv. have all the symptoms of malaria.

7. A company has several employees, all with different names, who perform interviews with job applicants (one applicant is interviewed by one employee). The job applicants also have different names. The interviewer makes appointments for interviews with the applicants. Each applicant may be interviewed at several occasions, possibly by different interviewers, but in that case the interviews take place during different days.
   The company has special interview rooms. Each interviewer uses the same room for all interviews during a day. A room may, however, be used by different interviewers during a day, as long as the interviews don't collide in time.
   The reservation of interview appointments is to be computerized. The database developer has decided to use a single relation for all data, with the following schema:
   Interviews(interviewer, applicant, day, time, room)

    i. From the text, find functional dependencies in the relation.
    ii. Find the keys of the relation.
    iii. Show that the relation is in 3NF but not in BCNF.
    iv. Decompose the relation in relations that are in BCNF.

8. Shops sell items at varying prices. Customers buy items from shops. This is described by the following relations:
   Shops(shopId, name, address)
   Items(itemId, name, description)
   Sells(shopId, itemId, price)
   Customers(customerId, name, address)
   Sales(saleId, customerId, itemId, shopId, date)

i. Write a procedure to print the name and address of all customers who haven't bought any item.
ii. Write a procedure for all customers that have bought at least one item: print the customer id and the total sum of all purchases.
iii. Write a function to print the number of shops that sell items with id's starting with 'EF'.
iv. Write a function to print the name and address of the shop(s) that sell the item with id = 'EF123-A' at the lowest price.

9. A company organizes its activities in projects. Products that are used in the projects are bought from suppliers. This is described in a database with the following schema:

   Projects(projNbr, name, city)
   Products(prodNbr, name, color)
   Suppliers(supplNbr, name, city)
   Deliveries(*supplNbr, prodNbr, projNbr*, number)

   i. Write a trigger which displays a message whenever an entry is made in the table 'Deliveries'.
   ii. Write a trigger which is invoked automatically whenever a product is supplied to the city 'London'.
   iii. Execute an exception if the 'number' field in 'Deliveries' table is zero.

10. Develop an application for the any one of the following using any front end tool to design the GUI and Oracle/MySql as back end.

a) A municipality needs a database containing information concerning the inhabitants of the municipality. The database will be used for the planning of schools, health care and child care.
b) A medical health research project has a database containing data about all patients at a hospital. For each patient, data about the symptoms that the patient shows is registered: fever, headache, cough, chest pains, Symptoms can have different severity: low, middle, or high. A patient may show several symptoms, e.g., high fever, medium headache and some cough. The database also contains data about diseases. Each disease is characterized by different symptoms: a patient with a cold should have fever and a cough, a malaria patient should have fever and fits of shivering, etc.
c) In a botanical survey, an inventory is made of the Swedish flora, i.e., it is investigated where different plants grow. Plants are identified by their Latin names: Anemone nemorosa, Ranunculus ficaria, etc.

   The survey is made at different sites. A site is described by its name ("The Midsum- mer Meadow in Stolphult"), its type ("meadow"), and its coordinates in the coordinate system Swedish Grid ("153100E, 670300N"). At a site, investigations are performed in 1 × 1 m squares. Each square also has coordinates, which are measured relative to the site coordinates. For each plant that occurs in a square, the degree of coverage (in percent) is recorded.

   Chemical analyses of different chemical properties are performed in some of the squares. Which analyses that are performed may vary, but common measurements are pH and the content of different heavy metals. The results of the measurements are given in different units: no unit, ppm, etc. survey involves a lot of people. Each person has a person number, name, and address. Each square is investigated by one person.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the concepts of database systems to design a good database schema for a given application. (Apply)
- Construct queries using SQL to extract information from a database. (Apply)
- Analyze various database design techniques to develop a database application for a given scenario. (Analyze)
- Design Database application for a given real life scenario using the concepts of SQL and PL/SQL. (Create)
- Communicate effectively to justify the computing solutions based on legal and ethical principles. (Affective domain)
- Function effectively as an individual or in teams to develop database application for a given scenario. (Affective domain)

HARDWARE AND SOFTWARE REQUIRMENTS

HARDWARE REQUIREWMENTS:

Personal Computers – 30 Numbers

SOFTWARE REQUIREMENTS:

Front end: VB or Equivalent

Back end: Oracle / SQL / MySQL / PostGress / DB2 or Equivalent

19UEC426	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	L	T	P	C
		0	0	3	1.5

PRE-REQUISITE :

COURSE OBJECTIVES:

- To introduce ALP concepts and features
- To write ALP for Arithmetic and logical operation in 8086 and 8051
- To differentiate serial and parallel interface
- To interface different I/Os with Microprocessor and Microcontroller.

LIST OF EXPERIMENTS

Microprocessor -8086

1.Basic Arithmetic and Logical operation

2.Code conversion and Matrix operation

3.Searching and Sorting Operation

4.Floating point operations and string manipulations

5. Move a data block without overlap

Microcontroller-8051

6. Basic Arithmetic and Logical Operation

7. Square and cube Program, Find 2's compliment of a number

8. Unpacked BCD to ASCII

9.Programming and verifying Timer, Interrupts and UART operations

Interfacing

10. A/D and D/A interfacing and waveform generation

11. Keyboard and Display interfacing

12. Stepper Motor interfacing

13. Traffic light controller

14. Simple applications using Arduino

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Develop assembly language programs to perform arithmetic and logical operations using 8086 and 8051.(Apply)
- Develop assembly language programs for various applications using 8086 microprocessor & 8051 microcontroller (Apply)
- Analyze the data transfer information through serial & parallel ports (Analyze)
- Analyze the various interfacing techniques to develop real time applications using 8086 microprocessor & 8051 Microcontroller. (Analyze)

19UGM431	GENDER EQUALITY	L	T	P	C
		1	0	0	P/F

PRE-REQUISITE:

COURSE OBJECTIVES :

- To introduce basic concepts relating to gender and to provide logical understanding of gender roles.

UNIT I	GENDER SENSITIZATION	5Hrs

Definition of gender, Perspectives-Gender sensitive approach- Gender and sex- Social construction of gender and gender roles- Socialization- institutions of socialization- changing content and context of gender-need for re-socialization. Gender Stereotyping and Gender Discrimination.

UNIT II	GENDER EQUALITY AND CONSTITUTION	5 Hrs

Indian constitution related to equality - Fundamental rights - Directive principles of state policy - right to equality - rights against exploitation - cultural and educational rights - the right to constitutional remedy - University Declaration of Human Rights - Enforcement of Human Rights for Women and Children - Role of Cells and Counseling Centers- Internal Complaints Committee - Legal AID cells, Help line, State and National level Commission.

UNIT III	GENDER ROLES & EQUALITY	5Hrs

Gender & Morality – Structural and functionalist views of Gender- Gender in the Classroom-Beyond access for girls and boys-Gender equality in schools-Gender equality and adult basic education-Developing capacity to achieve gender equality in education-Individuality and removal of gender stereotypes- Respect for each other's-Promote equal opportunity.

TOTAL:15 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Describe the social construction of gender and sexuality and their influence in social context. (Understand)
- Analyze how the concepts of gender equality are created, maintained, and/or challenged. (Analyze)
- Apply concepts of gender roles and equality in classroom, school, disciplinary or interdisciplinary creative, scholarly, and/or activist project. (Apply)

REFERENCES:

1. Sheila Aikman and Elaine Unterhalter, "Practising Gender Equality in Education", Oxfam GB, 2007.
2. Pasadena and Hackensack, "Gender roles and Equality", Salem Press,2011.

19UGM432	BASICS OF BIOLOGY FOR ENGINEERS (For CSE, CSBS &Mech)	L	T	P	C
		2	0	0	P/F

PRE-REQUISITE:

COURSE OBJECTIVES :

- To explain the essentials of basic biological principles.
- To familiarize the different clinical and industrial applications of biology for solving societal problems with engineering tools.

UNIT I	INTRODUCTION AND CLASSIFICATION	5 Hrs

Characteristics of living organisms – Basic classification – Cell theory – Structure of prokaryotic and eukaryotic cell – Introduction to Bio-molecules: Definition – General classification and important functions of Carbohydrates – Lipids – Proteins – Nucleic acids, Vitamins and Enzymes – Genes and Chromosome.

UNIT II	BIODIVERSITY	5 Hrs

Plant System: Basic concepts of Plant growth – Nutrition – Photosynthesis and Nitrogen fixation – Animal System: Elementary study of Digestive, Respiratory, Circulatory, Excretory systems and their functions.

UNIT III	BASICS OF CELL AND MOLECULAR BIOLOGY	6 Hrs

Discovery of cell and Cell Theory – Comparison between plant and animal cells – Cell wall – Plasma membrane – Modification of plasma membrane and intracellular junctions – Stem cells and Tissue engineering.

UNIT IV	HUMAN DISEASES	7 Hrs

Infectious and Non-infectious diseases – Causative agents – Epidemiology – Pathogenicity, Control and prevention – Treatment of AIDS – Tuberculosis – Pathology of non-infectious and genetic diseases and disorders – Cancer, Diabetes mellitus, Cardiac diseases – Neurological disorders – Parkinson's disease.

UNIT V	BIOLOGY AND ITS INDUSTRIAL AND CLINICAL APPLICATIONS	9Hrs

Transgenic plants and animals – Bioreactors – Bio-pharming – Recombinant vaccines – Cloning – Artificial memory and neural networks – Bioremediation – Biofertilizer – Biocontrol – Biofilters – Biosensors – Biopolymers – Bioenergy – Biochips.

TOTAL : 30 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the fundamentals of living things, their classification, cell structure and biochemical

constituents.(Understand)

- Apply the concept of plant, animal and microbial systems and growth in real life situations. (Apply)
- Analyze biological engineering principles, procedures needed to solve societal issues.(Analyze)

TEXT BOOKS:

1. Satyanarayana, U. “Biotechnology”, 4th Edition, Books and Allied Pvt. Ltd. Kolkata, 2007.
2. Carol D. Tamparo and Marcia A. “Diseases of the Human Body”, Lewis, F.A. Davis Company, 2011.
3. R. Khandpur, “Biomedical instrumentation - Technology and applications”, McGraw Hill Professional, 2004.

REFERENCE BOOKS

1. Lehninger A.L, Nelson D.L, Cox .M.M, Principles of Biochemistry”, CBS Publications 2017.
2. Arthur T. Johnson, “Biology for Engineers”, CRC Press, Taylor and Francis, 2nd Edition, 2019.
3. Cecie Starr, Ralph Taggart, Christine Evers and Lisa Starr, “Cell Biology and Genetics (Biology: The unity and diversity of life Volume I)”, Cengage Learning, 12th Edition, 2008.
4. B.D. Singh, “Biotechnology: Expanding horizon”, Kalyani Pub

Semester V

Course Code		Course Title	L	T	P	C
THEORY						
19UCS501	PC	Internet and Web Technology	2	0	3	3.5
19UCS502	PC	Software Engineering Practices(Common to CSE and CSBS)	3	0	0	3
19UCS503	PC	Mobile Applications Design and Development	2	0	3	3.5
19UCS504	PC	Theory of Computation	3	1	0	4
	PE	Professional Elective – I	3	0	0	3
	OE	Open Elective – I	3	0	0	3
19UGS531	BS	Reasoning and Aptitude	1	0	0	1
PRACTICAL						
19UCS507	PW	Creative Thinking and Innovation	0	0	2	1
19UGS532	HS	Soft Skills Laboratory	0	0	3	1.5
		TOTAL	**17**	**1**	**11**	**23.5**
Total No. of Credits – 23.5						

19UCS501	INTERNET AND WEB TECHNOLOGY	L	T	P	C
		2	0	3	3.5

PRE-REQUISITE:

COURSE OBJECTIVES :

- To develop web pages using HTML, HTML5, CSS and CSS3.
- To design interactive web pages using Scripting languages.
- To learn server side programming using PHP.
- To develop web pages using XML/XSLT.

UNIT I	HTML AND HTML5	6L + 9 P

Markup Languages: XHTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics-Some Fundamental HTML Elements - Headings - Lists - Links – Images - Tables-Frames-Forms. HTML5: HTML5 New Elements – HTML5 Graphics – HTML5 Audio and Video.

LIST OF EXPERIMENTS

1. Design an aesthetic web page with basic HTML elements to describe the instructions of any simple game. The web page should clearly specify the instructions to be followed by the players.

2. The 2021 ICC Men's T20 World Cup is scheduled to be the seventh ICC Men's T20 World Cup tournament, with matches taking place in the United Arab Emirates and Oman from 17 October to 14 November 2021. Design a web page that shows the match flow, schedule, venue, team players list with history, and ticket registration form using appropriate HTML elements.

3. Yoga Outreach Society develops and delivers life-affirming yoga programs to communities most under-served members. Partnering with yoga instructors, community organizations, social service agencies, and prisons to provide trauma-informed and strengths-based yoga programming for facility participants. Design a web page to meet the needs of the clients in all ages and skills who want to learn more about and take yoga classes. The website should give the details of class schedule, pricing, diet chart, and how to sign up. The clients may look the web page for knowing more about the different types of yoga available. **(AP)**

UNIT II	CSS AND CSS3	6L + 9 P

Style Sheets: Introduction to CSS – CSS Types–CSS Selectors - background images – colors and properties - manipulating texts using fonts - borders and boxes – margins - padding lists - positioning using CSS.CSS3: CSS3 Multi Backgrounds – CSS3 Text – CSS3 2D Transform and 3D Transform.

LIST OF EXPERIMENTS

1. Design a good-looking web site for your college containing a description of the courses, departments, faculty, and library etc, Use suitable HTML elements with CSS.
2. Design a web page of your home town with an attractive background color, text color, an Image, font etc. The web page should give the information about the trending news, tourist spots, food items, and a rating form about your hometown. Use suitable HTML elements with CSS.

3. Develop an animated website using HTML and CSS.

UNIT III	CLIENT SIDE SCRIPTING JAVA SCRIPT	6L + 9 P

The JavaScript Language – Syntax-Variables and Data Types – Operators – Literals-Control Statements– Functions- Arrays- JavaScript DOM and Events- forms and validations - CSS and JavaScript - Events and buttons.

LIST OF EXPERIMENTS

1. Develop a script that will determine whether a department-store customer has exceeded the credit limit on a charge account. For each customer, the following facts are available:
   a) Account number
   b) Balance at the beginning of the month
   c) Total of all items charged by this customer this month
   d) Total of all credits applied to this customer's account this month
   e) Allowed credit limit

   The script should input each of these facts from a prompt dialog as an integer, calculate the new balance (= beginning balance + charges – credits), display the new balance and determine whether the new balance exceeds the customer's credit limit. For customers whose credit limit is exceeded, the script should output HTML5 text that displays the message "Credit limit exceeded."

2. Hangman is a paper and pencil guessing game for two or more players. One player thinks of a word, phrase or sentence and the other tries to guess it by suggesting letters within a certain number of guesses. The word to guess is represented by a row of dashes, representing each letter of the word. In most variants, proper nouns, such as names, places, and brands, are not allowed. Slang words, sometimes referred to as informal or shortened words, are also not allowed. If the guessing player suggests a letter which occurs in the word, the other player writes it in all its correct positions. If the suggested letter does not occur in the word, the other player draws one element of a hanged man stick figure as a tally mark.

   The player guessing the word may, at any time, attempt to guess the whole word. If the word is correct, the game is over and the guesser wins. Otherwise, the other player may choose to penalize the guesser by adding an element to the diagram. On the other hand, if the other player makes enough incorrect guesses to allow his opponent to complete the diagram, the game is also over, this time with the guesser losing. However, the guesser can also win by guessing all the letters that appear in the word, thereby completing the word, before the diagram is completed.

3. Write a web page that enables the user to play the game of 15. There's a 4-by 4 board (implemented as an HTML5 table) for a total of 16 slots. One of the slots is empty. The other slots are occupied by 15 tiles, randomly numbered from 1 through 15. Any tile next to the currently empty slot can be moved into the currently empty slot by clicking on the tile. Your program should create the board with the tiles out of order. The user's goal is to arrange the tiles in sequential order row by row. Using the DOM and the click event, write a script that allows the user to swap the positions of the open position and an adjacent tile.

UNIT IV	SERVER SIDE SCRIPTING PHP	6 L + 9 P

PHP Variables and Operators – Control structures – Arrays –Strings - Function and Forms – PHP Classes and Objects – Constructors – Inheritance - PHP Databases : Connection to Server - Creating Database - Creating a Table, inserting data, altering tables, queries, deleting database,

deleting data and tables.

LIST OF EXPERIMENTS

1. Write a PHP Script for storing and retrieving employee information from MySql table
   i) Design a HTML form to collect employee details with salary
   ii) Store this employee details in Mysql database
   iii) Display all employee details in HTML table format
2. Design a HTML form to read a semester marks of 10 students from the user with proper validation. Write a PHP Script to read all the marks and calculate total and average of your semester marks and display the marks, total and average in HTML table format.
3. Create a class named 'Animal' with the data members, family and food. Use appropriate member functions to read and display the member data. Inherit the two classes 'Cow' and 'Lion' from the Animal class with the necessary methods.

UNIT V	XML AND AJAX	6 L + 9 P

Basics of XML - Building Blocks of XML – Names Space in XML - DTD and XML Schemas – XML Parser and Validation – XSL and XSLT Transformation – XSL Elements – XPATH AJAX: Ajax Client Server Architecture - XML Http Request Object – XML SOAP Protocol.

LIST OF EXPERIMENTS

1. Create internal and external DTD for a catalog of four stroke motorbikes, where each motorbike has the following child elements – make, model, year, color, engine and chasis number. The engine element has the child element engine number, number of cylinders, and type of fuel.
2. Use AJAX to retrieve data from an XML file and display it in table format.
3. Create a simple XML document contains student details where each student element has the student personal details with 4 subject marks and calculate total and average marks. All student details are display the web page in HTML table format using XSL and XSLT.

TOTAL : 75 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the basic and advanced web technologies. (Understand)
- Apply suitable web technologies to design a web page. (Apply)
- Analyze the sustainable web development and design methodology for a given real world scenario. (Analyze)
- Develop dynamic websites with good aesthetic sense of designing and latest technical know-how's. (Create)
- Develop web based application using suitable client side and server side web technologies. (Create)
- Work individually or in teams and demonstrate the solutions to the given exercises through presentation (Affective Domain)

TEXT BOOKS:

1. Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 1st Edition, Pearson Education India.

REFERENCE BOOKS:

1. Steven Holzner,"HTML BlackBook", DreamTech press.
2. Web Technologies, Black Book, DreamTech Press
3. Web Applications : Concepts and Real World Design, Knuckles, Wiley- India
4. Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel Pearson.
5. Zak Ruvalcaba Anne Boehm, "Murach's HTML5 and CSS3", 3rdEdition, Murachs/Shroff Publishers & Distributors Pvt Ltd, 2016.

19UCS502	SOFTWARE ENGINEERING PRACTICES	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- Understand the key concepts, principles and Process models of Traditional, Agile and DevOps.
- Describe and compare various software development methods and understand the context in which each approach might be applicable.
- To know about the quality checking mechanism for software process and product.

UNIT I	INTRODUCTION TO SOFTWARE PROCESS AND MODELS	9

Introduction – Life Cycle for Traditional – Generic Software Process Model: Prescriptive Process models: Waterfall Model, Incremental Process Models Evolutionary Process Models, Concurrent Models. Specialized Process Models – Agile Life Cycle - Agile Manifesto and Principles - Agile Software Engineering Process Models: Overview of Scrum - Extreme Programming - Feature Driven development - Lean Software Development . DevOps Lifecycle Phases – Principles – Agile Vs DevOps.

UNIT II	AGILE SCRUM FRAMEWORK	9

Introduction to Scrum Framework – Agile Scrum Methodology – Agile Planning and Estimation – Writing and Working in User Stories with Acceptance Criteria – Project Velocity – Tools for Agile Project Management - Case Study.

UNIT III	AGILE SOFTWARE DESIGN, DEVELOPMENT AND TESTING	9

Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design. Refactoring Techniques. Agile Testing Practices and Principles – Life Cycle – Methodologies: Test-Driven Development (TDD), xUnit framework , Exploratory testing, Risk based testing, Regression tests.

UNIT IV	INTRODUCTION AND FRAMEWORK FOR DevOps	9

Introduction to DevOps - Business application of DevOps - Business drivers/market trends - DevOps strategy - Benefits of DevOps. DevOps Framwork: DevOps process - DevOps progression frameworks - DevOps maturity models - DevOps best practices - Agile and DevOps. DevOps – Continuous Integration and Delivery: Continuous integration (CI) Continuous delivery (CD)

UNIT V	DevOps PLATFORM, TESTING AND DEPLOYMENT	9

Introduction - Cloud as a platform - Operations- Deployment Pipeline: Overall Architecture Building and Testing - Deployment- Case study: Migrating to Microservices

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to remember

- Explain the basic and advanced software development methodologies of traditional, agile and DevOps. **(Understand)**
- Apply suitable software methodologies to design a software product. **(Apply)**
- Analyze the sustainable software project development to design agile and DevOps software methodology for a given real world scenario. **(Analyze)**
- Develop software project application using suitable software development practices technologies. **(Create)**
- Develop dynamic software product with good aesthetic sense of designing and latest technical know-how′s. **(Create)**
- Work individually or in teams and demonstrate the software development methodologies to the given exercises through presentation **(Affective Domain)**

TEXT BOOKS:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Eighth Edition, McGraw-Hill International Edition, 2014.
2. Ken Schawber, Mike Beedle," Agile Software Development with Scrum**"**, Pearson, 2002.
3. Lenn Bass, Ingo Weber and Liming Zhu, " DevOps – A Software Architects Perspective", Addison – Wesley,

REFERENCE BOOKS:

1. Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2011.
2. Robert C. Martin , Micha Martin, " Agile Software Development, Principles, Patterns and Practices ", Pearson, 2007
3. Sricharan Vadapalli, " DevOps: Continuous Delivery , Integration and Deployment with DevOps – Rapid Learning Solution",

4. Lisa Crispin, Janet Gregory," Agile Testing: A Practical Guide for Testers and Agile Teams", Addison Wesley, 2008.
5. Alistair Cockburn, " Agile Software Development: The Cooperative Game ", Addison Wesley, 2006
6. Mike Cohn, " User Stories Applied: For Agile Software", Addison Wesley , 1st Edition
7. Kent Beck, "Test Driven Development: By Example", Addison Wesley, 2002.

19UCS503	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
		2	0	3	3.5

PRE-REQUISITE: JAVA PROGRAMMING

COURSE OBJECTIVES :

- Aims at providing techniques for deploying and testing mobile applications, and for enhancing their performance and scalability
- Identify the capabilities and limitations of mobile platforms that affect application development and deployment
- Elaborating the characterization and architecture of mobile applications
- Analyzing the impact of technology and business trends in mobile application development

UNIT I	INTRODUCTION TO MOBILE APPLICATION DEVELOPMENT	6 + 9

Introduction – Android architecture overview – Application manifest file - User level and project level gradle - Android Application lifecycle – Android activities – Write and view logs with Logcat - Android user interface fundamentals – Android widgets - Layouts – User interaction – User input controls – Event Handling - Building an APK.

Lab Exercise

1. Develop an application that uses GUI components, Font and Colors in various layouts.
2. Develop an android application to implement a User Input Control.
3. Develop an android application to demonstrate simple event handling.

UNIT II	USER INTERFACE DESIGN FUNDAMENTALS AND INTENT FILTERS	5 +12

Menus – Fragments – Views – Adapters – Drawables - styles – themes – material design - Intent

overview – Implicit intents – Explicit intents – Intents with activities – Intents with broadcast receivers.

Lab Exercise

4. Develop an android application to implement a custom design Action Bar.
5. Develop an android application to implement Menus.
6. Develop an android application to implement Fragments.
7. Develop an android application customized Sending Email, Sending SMS and Phone Calls using Intent and intent filter.

UNIT III	**SENSORS AND LOCATION BASED SERVICES**	**6+6**

Sensors and sensor manager – Monitoring device monitor and orientation – Environment sensors – Maps – Geocoding and location based services – Using location based services –Selecting a location provider – Using geocoder – Creating Map based activities.

Lab Exercise

8. Develop an android application to implement a Location Based Services.
9. Develop an android application to implement a Sensors.

UNIT IV	**MULTIMEDIA, TELEPHONY AND SMS MANAGER**	**7+12**

Audio, Video and Using the camera – Playing Audio and video – Manipulating raw audio – Using audio effects – Using the camera for taking pictures – Recording video – Bluetooth and WI-FI – Using Bluetooth – Managing Wi-Fi - Telephony and SMS – Using Telephony – Sending SMS and MMS

Lab Exercise

10. Develop a simple media player like application using services.
11. Develop an application to capture image using built in camera
12. Develop a simple Video player like application using video view and video Recorder.
13. Develop an application that creates an alert upon receiving a message and call.

UNIT V	**DATABASE CONNECTIVITY**	**6+6**

Overview of Cloud services and functions – Introduction to SQLlite and Firebase – Features of SQLlite and Firebase –SQLlite : CRUD Operations. Firebase : Adding Android application to

Firebase – Firebase Database - Store data into Firebase – Read data from Firebase – Firebase Authentication – Firebase storage – Firebase hosting.
Lab Exercise 14. Develop an android application to demonstrate SQLite Database. 15. Develop an android application to demonstrate Firebase Database.
TOTAL: 75 Periods
COURSE OUTCOMES: After the successful completion of this course, the student will be able to • Gain knowledge about the fundamentals of mobile application development tools and concepts(Understand) • Develop solutions to existing problems by building an effective and advanced application using integrated development environment.(Apply) • Analyze the existing security issues in real world scenario and build a secure, reliable and effective mobile application. (Analyze) • Evaluate the prominence of the deployed android application using Cloud hosting function. (Evaluate) • Design a full stack android mobile application that can be deployed to the real world. (Create) • Follow the design pattern and effectively communicate with team members to developan effective software product. (Affective domain)

TEXT BOOK:

1. ‘‘Head first android development, A brain friendly guide” – Dawn Griffiths and David Griffiths, Oreilly, third edition, 2015.

REFERENCE BOOKS:

1. ‘‘Android Application development”, O’reilly, Rick rogers, John Lombardo, Zegurdmednieks& Blake meike, 2009.
2. “Android 4 Application development” ,Retomeier, Jonhwiley& sons, 2007.

HARDWARE & SOFTWARE REQUIREMETs:

HARDWARE REQUIREMENT:

- Processor : I3 and above
- RAM SIZE: 4GB and above

SOFTWARE REQUIREMENT

- Java JDK
- Android studio
- Emulator

19UCS504	THEORY OF COMPUTATION	L	T	P	C
		3	1	0	4

PRE-REQUISITE: Transforms and Discrete Mathematics, Design and Analysis of Algorithms

COURSE OBJECTIVES :

- To understand various formal languages like Regular Language, Context Free Language, Context Sensitive Language and Recursively Enumerable language.
- To understand various Computing models like Finite State Machine, Pushdown Automata, Linear Bounded Automata and Turing Machine.
- To understand Decidability and Undecidability of various problems.

UNIT I	FINITE AUTOMATA	9+3

Introduction –Concepts of Automata theory– Chomsky Hierarchy of formal languages– Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon Transitions – Equivalence of NFA and DFA– Equivalence of € NFA and DFA –Equivalence of NFA and € NFA.

UNIT II	REGULAR LANGUAGE AND GRAMMAR	9+3

Regular Expression, Regular Language and Regular Grammar – Equivalence of FA and Regular Expressions– Equivalence of FA and Regular Grammar-Properties - Pumping Lemma for Regular Languages –Equivalence and Minimization of Automata.

UNIT III	CONTEXT FREE AND CONTEXT SENSITIVE LANGUAGE	9+3

Context-free grammars (CFG) and languages (CFL)–Derivation and Parse trees– Equivalence of Derivations and Parse Trees–Ambiguity in CFG– Normal forms of CFG – Chomsky and Greibach normal forms–Context Sensitive Grammars-Context Sensitive Languages.

UNIT IV	PUSH DOWN AUTOMATA AND LINEAR BOUNDED AUTOMATA	9+3

Introduction– Pushdown automata– Languages of PDA–Equivalence of PDA and CFG– Deterministic pushdown automata–Properties - Pumping lemma for context-free languages– Closure properties of CFLs– Linear Bounded Automata – Equivalence of LBA's and CSG's

UNIT V	TURING MACHINE AND UNDECIDABILITY	9+3

Turing Machines – Language of a Turing Machine – Turing Machine as a Computing Device – Programming Techniques for TM – Multi Tape Turing Machines, Equivalence of One Way and Multi–Tape Turing Machines.

A Language that is not Recursively Enumerable (RE) – An Undecidable Problem that is RE – Undecidable Problems about Turing Machine – Properties of Recursive and Recursively Enumerable Languages – Post's Correspondence Problem (PCP) – Modified Post Correspondence Problem– Time and tape Complexity measure of TM – the classes of P and NP – NP –completeness.

TOTAL:45 (L)+ 15(T)= 60 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Understand the concepts of formal languages and automata theory for solving various problems of engineering. (Understand)
- Apply the knowledge of formal languages and automata theory to solve complex engineering problems for pattern recognition and syntax checking. (Apply)
- Identify the suitable automata model for complex engineering problems for reaching sustained conclusions. (Analyze)
- Design an automata model to solve complex engineering problems based on grammar and languages.(Apply)
- Relate the equivalence of automata model and languages or grammars.(Analyze)
- Design computational models for a given problem using modern tools with the understanding of the limitations of the model: Flap /JFlap, DAG-O-Bert, Deus ex Machina, ASSIST.(Create)

TEXT BOOK:

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Pearson Education, Third Edition, 2008.

REFERENCE BOOKS :

1. Mishra K L P and Chandrasekaran N, “Theory of Computer Science-Automata, Languages and Computation”, Prentice Hall of India, Third Edition, 2007.

2. Harry R. Lewis and Christos H. Papadimitriou, “Elements of the theory of Computation”, Prentice-Hall of India Pvt. Ltd, Second Edition, 2009.

3. Kamala Krithivasan and R. Rama, “Introduction to Formal Languages, Automata Theory and Computation”, Pearson Education, Delhi, 2009.

4. J. Martin, “Introduction to Languages and the Theory of Computation”, Tata McGraw Hill, New Delhi, Third Edition, 2007.

5. MichealSipser, “Introduction to the Theory and Computation”, Cengage Learning India, 2012.

Semester VI

Course Code		Course Title	L	T	P	C
THEORY						
19UCS601	PC	Principles of Compiler Design	3	1	0	4
19UCS602	PC	Cryptography and Network Security	3	0	0	3
19UCS603	PC	Artificial Intelligence and Machine Learning(Common to CSE and CSBS)	3	0	0	3
	PE	Professional Elective – II	3	0	0	3
	PE	Professional Elective III	3	0	0	3
	OE	Open Elective – II	3	0	0	3
PRACTICAL						
19UCS607	PW	Product Development Project	0	0	8	4
19UCS608	PC	Artificial Intelligence and Machine Learning Laboratory(Common to CSE and CSBS)	0	0	3	1.5
19UGS633	HS	Interpersonal Skills Development Laboratory	0	0	3	1.5
MANDATORY COURSES						
19UGM632	MC	Indian Constitution	1	0	0	P/F

19UCS601	PRINCIPLES OF COMPILER DESIGN	L	T	P	C

		TOTAL	19	1	14	26
Total No. of Credits – 26						

		3	**1**	**0**	**4**

PRE-REQUISITE: THEORY OF COMPUTATION

COURSE OBJECTIVES :

- To learn various phases of compiler.
- To learn the design techniques of lexical analyzer for a language.
- To give knowledge on various parsing techniques.
- To give knowledge on different levels of translation and various optimization techniques.

UNIT I	**LEXICAL ANALYSIS**	**9+3**

Introduction-Compilers– Phases of a compiler -Role of Lexical Analyzer – Input Buffering. Specification and Recognition of Tokens –LEX –Finite Aotomata-Regular expressions to auttomata .

UNIT II	**SYNTAX ANALYSIS**	**9+3**

Need and Role of the Parser-Context Free Grammars –Top Down Parsing -General Strategies-Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item-Construction of SLR Parsing Table -Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC.

UNIT III	**INTERMEDIATE CODE GENERATION**	**9+3**

Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expression.

UNIT IV	**RUN TIME ENVIRONMENTS AND CODE GENERATOR**	**9+3**

Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management – Issues in Code Generation – Design of a simple Code Generator.

UNIT V	**CODE OPTIMIZATION**	**9+3**

Principal Sources of Optimization – Peep-hole optimization – DAG- Optimization of Basic Blocks-Global Data Flow Analysis – Efficient Data Flow Algorithm.

TOTAL: 45+15 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Design Finite Automata for recognizing the given pattern.(Create)

- Apply different parsing algorithms to develop the parsers for a given grammar.(Apply)
- Translate parsed source statements into three address statements.(Apply)
- Examine the right storage structure for the language constructs.(Analyze)
- Design a simple code generator for the given programing Language.(Apply)
- Apply the optimization techniques for target code generation.(Apply)

TEXT BOOKS:

1.Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, “Compilers- Principles, Techniques, and Tools”, Pearson Education Asia, 2007.

2. Holub, Allen I., “Compiler Design in C”, PHI, 2003.

REFERENCE BOOKS:

1. Randy Allen, Ken Kennedy, “Optimizing Compilers for Modern Architectures: A Dependence- based Approach”, Morgan Kaufmann Publishers, 2002.

2. Steven S. Muchnick, “Advanced Compiler Design and Implementation, “Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.

3. Keith D Cooper and Linda Torczon, “Engineering a Compiler”, Morgan Kaufmann Publishers Elsevier Science, 2004.

4. Charles N. Fischer, Richard. J. LeBlanc, “Crafting a Compiler with C”, Pearson Education, 2008

19UCS602	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To understand cryptography theories, algorithms and systems.
- To understand necessary approaches and techniques to build protection mechanisms in order to secure computer networks.

UNIT I	INTRODUCTION	9

Security trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT II	SYMMETRIC KEY CRYPTOGRAPHY	9

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures – Modular arithmetic-Euclid"s algorithm- Congruence and matrices – Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard – RC4 – Key distribution.

UNIT III	PUBLIC KEY CRYPTOGRAPHY	9

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler‘s totient function, Fermat‘s and Euler‘s Theorem – Chinese Remainder Theorem – Exponentiation and logarithm – ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange – ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography

UNIT IV	MESSAGE AUTHENTICATION AND INTEGRITY	9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications – Kerberos, X.509

UNIT V	SECURITY PRACTICE AND SYSTEM SECURITY	9
Electronic Mail security – PGP, S/MIME – IP security – Web Security – SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.		

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the various security algorithms, techniques and methodologies. (Understand)
- Analyze the techniques that protect and defend information, information systems by ensuring authentication. (Analyze)
- Apply symmetric cryptographic algorithms to ensure data secrecy. (Apply)
- Apply the mathematics of public key cryptographic algorithms. (Apply)
- Apply appropriate techniques to ensure message authentication and integrity.(Apply)
- Analyze the suitability of security algorithms for real time applications. (Analyze)

TEXT BOOK:

1. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

REFERENCE BOOKS:

1. K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd
2. BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.
3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

19UCS603	ARTIFICIAL INTELLIGENCEAND MACHINE LEARNING	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To introduce the fundamental concepts in Artificial Intelligence.
- To give an idea about the basics of designing intelligent agents that can solve general purpose problems.
- To introduce the concept of Machine Learning

UNIT I	AI AND PROBLEM SOLVING	9

Introduction – Agents – Problem formulation – uninformed search strategies – heuristics– informed search strategies – Heuristic functions.

UNIT II	KNOWLEDGE REPRESENTATION AND REASONING	9

Logical agents – propositional logic – inferences – first-order logic – inferences in first order logic – Knowledge engineering in FOL -unification – forward chaining – backward chaining –resolution.

UNIT III	REASONING UNDER UNCERTAINTY AND PLANNING	9

Uncertainty – review of probability - Inference using full joint distribution-probabilistic Reasoning – Bayesian networks –Syntax and semantics of Bayesian networks –Bayesian nets with continuous variable - Exact inference in Bayesian networks – Planning – Plan space Planning – Planning Graph and Graph plan.

UNIT IV	INTRODUCTION TO MACHINE LEARNING	9

Concept Learning – Types of Machine Learning – Features in Learning – Hypothesisand Hypothesis space – Training set and Test set – Instance space – Inductive bias – version space – over fitting – cross validation – Decision Tree – Neural Networks.

UNIT V	DEEP LEARNING	9

Linear Regression – Bayesian learning – Logistic regression – SVM –Neural Networks – Multi layer Neural network – Neural Network and back propagation algorithm.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the students will be able to

- Represent and Formulate more variety of sentences using Propositional and predicate logic. [Apply]
- Analyse a Problem situation and formulate it in terms of state space search problem and recommend the actions that the agent can execute. [Analyse]
- Build reasoning systems that use network models to reason with uncertainty according to the laws of probability theory. [Create]
- Construct the planning graph and extract the solution plan from planning graph [Create]
- Analyse the given data set and predict decisions for the given scenario. [Analyse]
- Develop a model that makes rational decisions in important domains like Medical diagnosis, Health care and Business. [Create]

TEXT BOOKS:

1. S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Education, 2003.
2. D. Poole and A. Mackworth. Artificial Intelligence:Foundations of Computational Agents,Cambridge University Press, 2010.

REFERENCE BOOKS:

1. David Poole, Alan Mackworth, Randy Goebel, ”Computational Intelligence : a logical approach”, Oxford University Press, 2004.
2. G. Luger, “Artificial Intelligence: Structures and Strategies for complex problem solving”, Fourth Edition, Pearson Education, 2002.
3. J. Nilsson, “Artificial Intelligence: A new Synthesis”, Elsevier Publishers, 1998.
4. R. Brachman, H. Levesque. Knowledge Representation and Reasoning, MorganKaufmann, 2004.

19UCS608	ARTIFICIAL INTELLIGENCEAND MACHINE LEARNING LABORATORY	L	T	P	C
		0	0	3	1.5

PRE-REQUISITE :

COURSE OBJECTIVES:

- Implementing the basic concepts in Artificial Intelligence.
- Implementing Machine Learning Algorithms

LIST OF EXPERIMENTS

1. Implement Breadth First Search (for 8 puzzle problem or Water jug problem or any AI search problem)
2. Implement Depth First Search (for 8-queen problem or 8 puzzle problem or Water jug problem or any AI search problem)
3. Solve travelling salesperson problem using Best First Search
4. Build a Knowledge based system for forecasting the weather
5. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.
6. Demonstrate the working of decision tree based on ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify the new sample
7. Construct model to predict the residential home prize as a function of the homes living area.
8. Develop a model to determine the likelihood of a patient's successful response to a specific medical treatment
9. Develop an algorithm to predict whether a particular customer buy a computer or not based on the following attribute age, income, student and credit rating.
10. Given the symptoms exhibited in a patient and a database of anonymized patient records, Develop a model to predict whether the patient is likely to have an illness.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Implement search Algorithms for multiple state real world problems. [Apply]
- Build rule based expert system for domain specific applications. [Create]
- Construct Bayesian network model for the given problem and use this model to make rational decision. [Create]
- Construct decision tree for the given dataset and use this to classify new samples. [Create]
- Build linear regression analytical model to relate several input variable to continuous output variable. [Create]

HARDWARE AND SOFTWARE REQUIRMENTS

HARDWARE REQUIREWMENTS:

Personal Computers – 30 Numbers

SOFTWARE REQUIREMENTS:

Python 2.7 and higher versions

Semester VII

Course Code		Course Title	L	T	P	C
THEORY						
19UME701	HS	Project Management and Finance	3	0	0	3
19UCS702	PC	Cloud Computing	3	0	0	3
19UCS703	PC	Building Internet of Things	3	0	0	3
	PE	Professional Elective IV	3	0	0	3
	PE	Professional Elective V	3	0	0	3
	OE	Open Elective – III	3	0	0	3
PRACTICAL						
19UCS707	PW	Summer Internship	0	0	0	1
19UCS708	PC	Cloud Computing Laboratory	0	0	3	1.5
19UCS709	PC	Internet of Things Laboratory	0	0	3	1.5
MANDATORY COURSES						
19UGM731	MC	Professional Ethics and human values	2	0	0	P/F
		TOTAL	**20**	**0**	**6**	**22**
Total No. of Credits – 22						

19UCS702	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To introduce the essentials of building fully featured applications on various cloud models.
- To familiarize the concepts of designing and developing various service models and deployment models
- To impart the knowledge of classic data centre and different cloud applications.

UNIT I	OVERVIEW OF CLOUD COMPUTING AND INFRASTRUCTURE AS A SERVICES	9

Overview: Roots or Evolution, Characteristics and Benefits of Cloud Computing-The cloud computing reference and Deployment Models and its desired features Economics of Cloud – Open Challenges - Virtualization: Characteristics of virtualized environments - Virtualization and cloud computing - Pros and cons of virtualization - Technology examples: Xen: Para-virtualization, VMware: full virtualization, Microsoft Hyper-V.

UNIT II	CLASIC DATA CENTRES	9

Application – DBMS – Compute – Storage – Networking – Object based and Unifies storage Technologies – and Back-up, Replication technologies – CDC Management - Architectural design of compute and storage clouds - Public cloud Platforms: GAE, AWS, AND AZURE – Inter Cloud Resource Management.

UNIT III	PLATFORM AS A SERVICE / SOFTWARE AS A SERVICE	9

Aneka Tools: Aneka Cloud Platform - Aneka Resource Provisioning Service - Hybrid Cloud implementation - Workflow engine for clouds – Workflow management Systems on Cloud, Utilizing Cloud for workflow execution - Building Aneka clouds - Cloud programming and management. Map Reduce: The Map-Reduce Programming model and Implementation – Map-Reduce Programming model - Major Map-Reduce implementation for the cloud..

UNIT IV	DATA SECURITY AND MANAGING THE CLOUD	9

Software Testing Life Cycle for traditional and Agile and its impact on testing - Software Testing Strategies: A Strategic Approach to Software Testing - Test Strategies for Conventional Software - Test Strategies for Object-Oriented Software- Test Strategies for WebApps and Mobile Apps -

Validation and System Testing - The Art of Debugging. Testing Conventional Applications: White-Box Testing - Basis Path Testing - Control Structure Testing - Black-Box Testing - Model-Based Testing.

UNIT V	CLOUD PLATFORM IN INDUSTRY AND CLOUD APPLICATIONS	9

Cloud in Industry: Amazon Web Services, Google App Engine, Microsoft Azure – Emerging Cloud Software Environments. Cloud Scientific Applications: HealthCare Cloud Business and Consumer Application in CRM and ERP.

TOTAL:45 Periods

Beyond the Syllabus: **Hadoop**

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to remember

After the successful completion of this course, the student will be able to,

- Apply the Basics of cloud computing and virtualization techniques in building a cloud computing environment [Apply].
- Analyze the applications of classic data centre and identify the suitable cloud service system for the given applications [Analyze]
- Apply Aneka tools and Map Reduce Technique in Cloud services on PaaS and SaaS [Apply].
- Analyze various Challenging issues and risks associated with cloud security. [Analyze]
- Identify and Evaluate the suitable model and types of cloud computing for the cloud applications on scientific and Business. [Evaluate]
- Implement the customized virtualized cloud for various applications. [Create]

TEXT BOOKS:

1. Raj Kumar Buyya, James Broberg, AndrezeiM.Goscinski," Cloud Computing: Principles and paradigms", Wiley 2013.
2. Rajkumar Buyya, Christian Vecchiola, S. Tahamarai Selvi, "Mastering Cloud Computing: Foundation Application Programming", mk publications.
3. Kai Hwang Geoffrey C. Fox Jack J. Dongarra, "Distributed and Cloud Computing: From Parallel Processing to the Internet of Things" 2012 Elsevier.

REFERENCE BOOKS:

1. John W. RittingHouse and James F. Ransome, " Cloud Computing: Implementation, Management and Security", CRC Press.
2. Judith Hurwitz, Robin Bloor, Marcia Kaufman, and Dr. Fern Halper, " Cloud Computing for Dummies", Wile Publishing, Inc.
3. Cloud infrastructures and services EMC2 Bangalore book.

19UCS703	BUILDING INTERNET OF THINGS	L	T	P	C
		3	0	0	3

PRE-REQUISITE: Fundamentals of computer network, Network Security, internet technology.

COURSE OBJECTIVES :

In this course, student will explore various components of Building Internet of things such as Sensors, internetworking and cyber space. In the end they will also be able to design and implement IoT circuits and solutions.

UNIT I	INTRODUCTION TO IOT	9

Sensing, Actuation, Networking basics, Communication Protocols, Sensor Networks, Machine-to-Machine Communications, IoT Definition, Characteristics. IoT Functional Blocks, Physical design of IoT, Logical design of IoT, Communication models & APIs.

UNIT II	M2M TO IOT	8

The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics. Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT

UNIT III	M2M VS IOT AN ARCHITECTURAL OVERVIEW	8

Building architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. Reference Architecture and Reference Model of IoT.

UNIT IV	IOT REFERENCE ARCHITECTURE	9

Getting Familiar with IoT Architecture, Various architectural views of IoT such as Functional, Information, Operational and Deployment. Constraints affecting design in IoT world- Introduction, Technical design Constraints.

UNIT V	DOMAIN SPECIFIC APPLICATIONS OF IOT AND DEVELOPING IOT SOLUTIONS	11

Home automation, Industry applications, Surveillance applications, Other IoT application. Introduction to different IoT tools, Introduction to Arduino and Raspberry Pi Implementation of IoT with Arduino and Raspberry, Cloud Computing, Connected Vehicles, Data Aggregation for the IoT in

Smart Cities, Privacy and Security Issues in IoT.

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Understand general concepts of Internet of Things (IoT) (Understand)
- Recognize various devices, sensors and applications (Understand)
- Apply design concept to IoT solutions (Apply)
- Analyze various M2M and IoT architectures (Analyze)
- Evaluate design issues in IoT applications (Evaluate)
- Create IoT solutions using sensors, actuators and Devices (Create)

TEXT BOOKS:

1. CharalamposDoukas , Building Internet of Things with the Arduino, Create space, April 2002.
2. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011.

REFERENCE BOOKS:

1.Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

2. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-onApproach)”, 1st Edition, VPT, 2014

3. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013

4. Cuno Pfister, Getting Started with the Internet of Things, O‟Reilly Media, 2011, ISBN: 978-1-4493- 9357-1

19UCS708	CLOUD COMPUTING LABORATORY	L	T	P	C
	(COMMON TO CSE & IT)	0	0	2	1

PRE-REQUISITES :

COURSE OBJECTIVES:

- To make the students understand concepts of virtualization and to use cloud as Infrastructure, Platform, Software services.
- To provide an overview of concepts of Various Cloud Applications.

LIST OF EXPERIMENTS

1. Decide which applications you are going to install on your virtual machine according to that install 32 or 64-bit Operating system in VM. Because, Some applications are not compatible with old operating systems. So you should install higher version of Windows to work with UFT and also check OS compatibility of your required application before proceeding with operating system installation and to check if your processor will supports in a specific virtual machine. After checking, you can install and run the any one or two virtual machines.

2. Create a VM using Virtual Box and Install a C compiler through the VM and create and run the program to find sum of array elements using pointers in C compiler.

3. Writing a word count application program in Map-Reduce algorithm to read the text file and count the frequency of the words and sums the counts for each word in java language for assuming a huge dataset. Examples of dataset is given below.

" Hello I am studying Sethu Institute of Technology"

" Hello I am Ram"

4. Create a Virtual Machine and apply the allocation algorithm for created virtual machine in an Eclipse IDE using CloudSim tool for creation a datacenter with one host and run one cloudlet on it.

5. Create two VM and three Cloudlet services then allocate these services to the VM's and apply the task scheduling algorithm in an Eclipse IDE using CloudSim Tool for creation a datacenter with one host and run one cloudlet on it .

6. Create two VM and three Cloudlet services then allocate these services to the VM's and apply the Energy Conscious Model in an Eclipse IDE using CloudSim Tool for creation a two datacenter with one host and run one cloudlet on it .

7. Create a simple app program to find Total, Average and Percentage of 5 subjects with five different marks using arithmetic operators to perform arithmetic operations for the cloud using python or java in an Google App Engine in Eclipse.

8. Create a basic user comment form that will display the content that the user submits via that form on an HTML template and create a basic application that can serve static files, such as CSS or images. After you have set up your development environment, you can write the code for the application and deploy it to App Engine.

9. Create a one text file s or image file that contain minimum 5 MB content and those file is transfer form one virtual machine like VM Ware to another virtual machine like Oracle Virtual Box.

10. To host a static website on Amazon S3, you configure an Amazon S3 bucket for website hosting and then upload your website content to the bucket. When you configure a bucket as a static website, you enable static website hosting, set permissions, and add an index document. Depending on your website requirements, you can also configure other options, including redirects, web traffic logging, and custom error documents.

TOTAL : 45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to,

- Configure and Install the various Virtualization tools such a sVM Ware, Oracle Virtual Box to create simple program using C, Java with Hadoop Map-Reduce. [Create]
- Learn how to simulate a cloud environment to implement a new allocation, scheduler algorithm and Energy Conscious model in an Eclipse IDE using CloudSim Tool. [Apply].
- Learn how to create simple application program using python or java, enable Cloud Storage access to your App Engine and create a basic user comment and files in the cloud development environment. [Create].
- To learn developing and hosting the simple web page in cloud environment and to transfer the file form one VM to another. [Create]

HARDWARE: COMPUTERS REQUIRED – 30 Nos with minimum 16 MB RAM .

SOFTWARE: VMWare, Any OS, Cloud Service

19UCS709	INTERNET OF THINGS LABORATORY	L	T	P	C
		3	0	0	3

PRE-REQUISITE :

COURSE OBJECTIVES:

- To understand the working of sensor
- To understand the working of various micro controllers
- To solve real world problem using arduino

LIST OF EXPERIMENTS

1. Introduction to various sensors and various actuators & its Application (Students have to prepare Report for the same). Perform Experiment using Arduino Uno to measure the distance of any object using Ultrasonic Sensor.

a) PIR Motion Sensor.

b) Rain Drop Sensor.

c) Moisture Sensor.

d) Temperature Sensor.

e) Touch Sensor.

f) Infrared Sensor.

g) Servo Moto.

h) RFID Sensor.

i) Bluetooth Module.

j) Wi-Fi Module.

2. Demonstrate NodeMCU and its working

3. Getting Started with ESP8266 Wi-Fi SoC

4. Hands-on with on-board peripherals of ESP8266

5. Demonstrate Arduino and its pins.

6. Perform Experiment using Arduino Uno to measure the distance of any object using Ultrasonic Sensor.

7. Create a circuit using Arduino and sensors. Perform experiment using Arduino Uno to Learn Working of Servo Motor

8. Creating a webpage and display the values available through Arduino.

9. Demonstration of Setup & Working of Raspberry Pi. (Students have to prepare the Report for the same.).

10. OPEN Ended problem: Students are required to submit an IOT based project using the Microcontroller or a Raspberry Pi and connecting various sensors and actuators. The data for the same should be displayed via a webpage or a web app.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the Functionalities of various sensors (Apply)
- Apply the Arduino programming to measure various environment patterns (Apply)
- Analyze the working of various micro controller platforms (Analyze)
- Create an IoT based application to solve real world problems (create)

HARDWARE AND SOFTWARE REQUIRMENTS

HARDWARE REQUIREWMENTS:

Personal Computers – 30 Numbers

SOFTWARE REQUIREMENTS:

Arduino Board, Raspberry Pi, ESP8266 Wi-Fi SoC, ESP8266, Sensors

LIST OF ELECTIVES

Course Code	Course Title	L	T	P	C
19UCS901	Graph Theory	3	0	0	3
19UCS902	Parallel andDistributedAlgorithms	3	0	0	3
19UCS903	Quantum Computing	3	0	0	3
19UCS904	Information theory and Coding	3	0	0	3
19UCS905	Embedded Systems	3	0	0	3
19UCS906	Fault Tolerant Computing	3	0	0	3
19UCS907	Ad Hoc and Sensor Networks	3	0	0	3
19UCS908	Computer Graphics	3	0	0	3
19UCS909	Data Mining	3	0	0	3
19UCS910	Neural Networks and Deep Learning	3	0	0	3
19UCS911	Speech and Natural Language Processing	3	0	0	3
19UCS912	Data Analytics	3	0	0	3
19UCS913	Information Retrieval	3	0	0	3
19UCS914	Expert Systems	3	0	0	3
19UCS915	Image Processing	3	0	0	3
19UCS916	Introduction to Digital Signal Processing	3	0	0	3
19UCS917	Human Computer Interaction	3	0	0	3
19UCS918	Blockchain Technology	3	0	0	3
19UCS919	Cyber Security	3	0	0	3
19UCS920	Multicore Programming	3	0	0	3
19UCS921	Information Storage Management	3	0	0	3
19UCS922	C# and .NET Framework	3	0	0	3
19UCS923	Game Programming	3	0	0	3
19UCS924	Fuzzy logic	3	0	0	3
19UCS925	Mobile and Pervasive computing	3	0	0	3
19UCS926	Business Intelligence and its applications	3	0	0	3
19UCS927	Mixed Reality	3	0	0	3
19UCS928	Green Computing	3	0	0	3

Course Code	Course Title	L	T	P	C
19UCS929	Advanced Java Programming	3	0	0	3
19UCS930	XML and Webservices	3	0	0	3
19UCS931	Distributed Systems	3	0	0	3
19UCS932	Robotics and Applications	3	0	0	3
19UCS933	E-Learning Concepts	3	0	0	3
19UIT911	Building Enterprise Applications	3	0	0	3
19UIT912	Software Testing	3	0	0	3

19UCS901	GRAPH THEORY	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- Be familiar with the most fundamental Graph Theory topics and results
- Be exposed to the techniques of proofs and analysis
- Equip the students with problem solving, critical thinking to solve real-world problems

UNIT I	INTRODUCTION	9

Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits –

UNIT II	TREES & CONNECTIVITY	9

Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees- On Counting Trees- Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-Isomorphism – 2-Isomorphism

UNIT III	PLANARITY ,MATRICES & COLOURING	9

Combinational and geometric graphs – Planar graphs – Different representation of a planar graph-Detection of Planarity-Combinational and geometric Dual

Matrix Representation of Graphs-Incidence Matrix-Submatrices- Circuit Matrix-Cut-set Matrix-Path Matrix-Adjacency Matrix

Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem

UNIT IV	DIRECTED GRAPHS	9

Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler Digraphs-Fundamental Circuits in Digraphs-Orientation and Tournaments-Acyclic Digraphs and Decyclization

UNIT V	ADVANCED TOPICS	9

Perfect Graphs-Matroids-Ramsey Theory- External Graphs-Random Graphs- Applications

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Understand the mathematical definitions of objects in graph theory (Understand)
- Identify mathematical definitions to construct examples and to distinguish examples from non-examples (Apply)
- Validate and critically assess a mathematical proof.(Analyze)

  Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.(Analyze)
- Formulate and prove central theorems about trees, matching, connectivity, colouring and planar graphs (Create)
- Reason from definitions to construct mathematical proofs.(Evaluate)

TEXT BOOKS:

1. Douglas B. West, Introduction to Graph Theory, Prentice Hall of India.
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science. Prentice-Hall.
3. Graph Theory, by J. A. Bondy and U. S. R. Murthy, Springer Verlag (2008.)

REFERENCE BOOKS:

1. Frank Harary, Graph Theory, Narosa.
2. R. Ahuja, T. Magnanti, and J. Orlin, Network Flows: Theory, Algorithms, and Applications, Prentice-Hall.

19UCS902	PARALLEL AND DISTRIBUTED ALGORITHMS	L	T	P	C
		3	0	0	3

PRE-REQUISITE: Distributed systems, Basics of Algorithms, Estimation of Complexity.

COURSE OBJECTIVES :

- To understand the foundations of distributed systems.
- To learn issues related to clock Synchronization and the need for global state in distributed systems.
- To learn distributed mutual exclusion and deadlock detection algorithms.
- To study the main classes of fundamental parallel algorithms.
- To study the complexity and correctness models for parallel algorithms

UNIT I	INTRODUCTION	9

Definition-Model of Distributed Computation-Snapshot Algorithms for FIFO Channels-non FIFO Channels-Terminology and basic algorithm

UNIT II	MESSAGE ORDERING & TERMINATION DETECTION	9

Message ordering and group communication: Message ordering paradigms –Asynchronous execution with synchronous communication –Synchronous program order on an asynchronous system –Group communication – Causal order (CO) - Total order. Termination Detection-System Model of a distributed system-Termination detection using distributed snapshots-Termination detection by weight throwing.

UNIT III	DISTRIBUTED MUTEX & DEADLOCK	9

Distributed mutual exclusion algorithms: Introduction – Preliminaries – Lamport‘s algorithm – Ricart-Agrawala algorithm – Maekawa‘s algorithm – Suzuki–Kasami‘s broadcast algorithm. Deadlock detection in distributed systems: Introduction – System model – Preliminaries – Models of deadlocks – Knapp‘s classification – Algorithms for the single resource model, the AND model and the OR model.

UNIT IV	SELECTION & SORTING ALGORITHMS	9

Introduction –The need for Parallel Computers-Models of Computation-Analyzing Algorithms-Expressing Algorithms-Selection-Sorting-Sorting on a Linear Array-Sorting on the CRCW,CREW and ERWW Model

UNIT V	SEARCHING & NUMERICAL PROBLEMS	9

Searching a sorted sequence —- Matrix Transpositions – Matrix by Matrix multiplications – Matrix by vector multiplication-Numerical Problems-Solving Systems of Linear Equations-Finding Roots of NonLinear Equations-Solving Partial Differential Equations

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of the course, the students will be able to:

- Elucidate the foundations and issues of distributed systems (Apply)
- Create Model for Distributed Computations (Apply)
- Develop Synchronization scheme for the distributed system (Apply)
- Evaluate Mutual Exclusion and Deadlock detection algorithms in the Distributed system(Analyze)
- Develop parallel algorithms for selection and sorting (Apply)
- Analyze various algorithms to solve Numerical problems(Analyze)

TEXT BOOKS:

1. Kshemkalyani, Ajay D., and Mukesh Singhal. Distributed computing: principles, algorithms, and systems. Cambridge University Press, 2011.
2. George Coulouris, Jean Dollimore and Tim Kindberg, —Distributed Systems Concepts and Design‖, Fifth Edition, Pearson Education, 2012.

3.Selim G. Akl, The Design and Analysis of Parallel Algorithms, Prentice Hall, New Jercy, 1989.

REFERENCE BOOKS:

1. Pradeep K Sinha, “Distributed Operating Systems: Concepts and Design”, Prentice Hall of India, 2007.
2. Mukesh Singhal and Niranjan G. Shivaratri. Advanced concepts in operating systems. McGraw-Hill, Inc., 1994.

19UCS903	QUANTUM COMPUTING	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To introduce the building blocks of a quantum computer and design techniques of simple quantum circuits.
- To explain the quantum algorithms.
- To learn about quantum computational complexity.

UNIT I	FOUNDATION	9

Overview of traditional computing – Church-Turing thesis – circuit model of computation – reversible computation – quantum physics – quantum physics and computation – Dirac notation and Hilbert Spaces – dual vectors – operators – the spectral theorem – functions of operators – tensor products – Schmidt decomposition theorem.

UNIT II	QUBITS AND QUANTUM MODEL OF COMPUTATION	9

State of a quantum system – time evolution of a closed system – composite systems – measurement – mixed states and general quantum operations – quantum circuit model – quantum gates –universal sets of quantum gates – unitary transformations – quantum circuits.

UNIT III	QUANTUM ALGORITHMS – I	9

Superdense coding – quantum teleportation – applications of teleportation – probabilistic versus quantum algorithms – phase kick-back – the Deutsch algorithm – the Deutsch- Jozsa algorithm – Simon's algorithm – Quantum phase estimation and quantum Fourier Transform – eigenvalue estimation.

UNIT IV	QUANTUM ALGORITHMS – II	9

Order-finding problem – eigen value estimation approach to order finding – Shor's algorithm for order finding – finding discrete logarithms – hidden subgroups – Grover's quantum search algorithm – amplitude amplification – quantum amplitude estimation – quantum counting – searching without knowing the success probability.

UNIT V	QUANTUM COMPUTATIONAL COMPLEXITY AND ERROR CORRECTION	9

Computational complexity – black-box model – lower bounds for searching – general black-box lower bounds – polynomial method – block sensitivity – adversary methods – classical error correction –classical three-bit code – fault tolerance – quantum error correction – three- and nine-qubit quantum codes – fault-tolerant quantum computation.

TOTAL: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the fundamental concepts of quantum computing. (Understand)
- Develop quantum logic gate circuits (Apply)
- Develop quantum algorithms. (Apply)
- Solve order finding problem. (Apply)
- Solve Error correcting mechanism for quantum computing. (Apply)
- Evaluate the main sources of error that can occur during quantum computation(Evaluate)

TEXT BOOKS:

1. P. Kaye, R. Laflamme, and M. Mosca, “An introduction to Quantum Computing”, OxfordUniversity Press, 1999.

2. Michael A. Nielsen, Isaac L. Chuang,Cambridge,”Quantum Computation and QuantumInformation”, University press,2010.

REFERENCE BOOKS:

1. V. Sahni, “Quantum Computing”, Tata McGraw-Hill Publishing Company, 2007.

2. AnirbanPathank,” Elements of Quantum Computation and QuantumCommunication”,CRC Press,2013.

3. Eleanor G. Rieffel and Wolfgang H. Polak,” Quantum Computing:A Gentle Introduction”, MIT press,2011.

4. Dan.C.Marinescu, Gabriela M. Marinescu,” Approaching Quantum Computing”, Pearson Publication,2007.

19UCS904	INFORMATION THEORY AND CODING	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

The student should be made to:

- Understand error–control coding.
- Understand encoding and decoding of digital data streams.
- Be familiar with the methods for the generation of these codes and their decoding techniques.
- Be aware of compression and decompression techniques.
- Learn the concepts of multimedia communication.

UNIT I	INFORMATION THEORY	9

Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding - Joint and conditional entropies, Mutual information - Discrete memoryless channels – BSC, BEC – Channel capacity, Shannon limit.

UNIT II	SOURCE CODING: TEXT, AUDIO AND SPEECH	9

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3 - Speech: Channel Vocoder, Linear Predictive Coding

UNIT III	SOURCE CODING: IMAGE AND VIDEO	9

Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG standard.

UNIT IV	ERROR CONTROL CODING: BLOCK CODES	9

Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes - Linear block codes, Cyclic codes - Syndrome calculation, Encoder and decoder – CRC

UNIT V	ERROR CONTROL CODING: CONVOLUTIONAL CODES	9

Convolutional codes – code tree, trellis, state diagram - Encoding – Decoding: Sequential search and Viterbi algorithm – Principle of Turbo coding

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the knowledge of information theory and linear algebra in source coding and channel

coding to the solution of complex engineering problems. (APPLY)

- Apply the knowledge of reduction based coding techniques for text, audio and speech type of data to the solution of complex engineering problems. (APPLY)
- Apply the knowledge of multimedia communication to the solutions for computer applied complex engineering problems. (APPLY)
- Apply the knowledge of complex engineering problems for error detection and correction techniques. (APPLY)
- Apply the knowledge of convolution codes for performance analysis & cyclic codes for error detection and correction to the solution of complex engineering problems. (APPLY)
- Design solutions for computer applied complex engineering problems of BCH & RS codes for Channel performance improvement against burst errors. (CREATE)

TEXTBOOKS:

1. R Bose, “Information Theory, Coding and Crptography”, TMH 2008
2. Fred Halsall, “Multidedia Communications: Applications, Networks, Protocols and Standards”, Perason Education Asia, 2002

REFERENCE BOOKS:

1. K Sayood, “Introduction to Data Compression” 3/e, Elsevier 2006
2. S Gravano, “Introduction to Error Control Codes”, Oxford University Press 2007
3. Amitabha Bhattacharya, “Digital Communication”, TMH 2006

19UCS905	EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

PRE-REQUISITE: Microprocessor and Microcontrollers

COURSE OBJECTIVES :

- To provide an overview of Design Principles of Embedded System.
- To provide clear understanding about the role of firmware , operating systems in correlation with hardware systems.

UNIT I	INTRODUCTION TO EMBEDDED SYSTEMS	9

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT II	TYPICAL EMBEDDED SYSTEM	9

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS),

UNIT III	MEMORY	9

Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems.

UNIT IV	COMMUNICATION INTERFACE	9

Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT V	EMBEDDED SYSTEM APPLICATION AND DEVELOPMENT	9

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Expected to understand the selection procedure of Processors in the Embedded domain.
- Design Procedure for Embedded Firmware.
- Expected to visualize the role of memory in Embedded Systems
- Expected to evaluate the Correlation between sensors and actuators

TEXT BOOK

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

REFERENCE BOOKS:

1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems – Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education.

19UCS906	FAULT TOLERANT COMPUTING	L	T	P	C
		3	0	0	3
PRE-REQUISITE:NIL					

COURSE OBJECTIVES :

The student should be made to:

- To understand the error model and its operation
- Fault tolerance and architecture
- Fault tolerant software

UNIT I	INTRODUCTION	9

Fault Prevention -Fault tolerance – anticipated and unanticipated Faults- Test generation for digital systems- Combinational logic. Network Boolean difference method test generation for sequential circuits- fault simulation.

UNIT II	ERROR MODEL	9

General coding scheme – Parity checking code- arithmetic code – code for computer memories – checking errors in logical operation – communication coding.

UNIT III	FAULT TOLERANCE	9

Coding technique-fault tolerant self-checking and fail safe circuits-fault tolerant in combinatorial and sequential circuits- synchronous and asynchronous fail safe circuits.

UNIT IV	ARCHITECTURE	9

Fault tolerant computers - general purpose commercial systems-fault tolerant multiprocessor and VLSI based communication architecture.

UNIT V	FAULT TOLERANT SOFTWARE	9

Design-N-version programming recovery block - acceptance tests-fault trees- validation of fault tolerant systems.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Identify the proper methods for preventing anticipated and unanticipated faults. (Apply)
- Select the proper test generation method for sequential circuits. (Apply)
- Apply the various coding scheme for computer memories and checking errors. (Apply)
- Illustrate the various techniques for fault tolerance in combinatorial and sequential circuits. (Apply)
- Employ various types of architecture model for fault tolerant systems. (apply)
- Choose the proper testing methods to validate the fault tolerant system. (Apply)

TEXT BOOKS:

1. K.K.Pradhan, “Fault Tolerant computing theory and techniques” volume III. Prentice Hall, 1989
2. Anderson and Lee, “Fault Tolerant principles and practice”, PHI 1989.

REFERENCE BOOKS:

1. Paragon K. Lala, “Fault Tolerant and Fault Testable, Hardware design” PHI 1985.
2. LALA, “Digital systems design using PLD’s “,PHI 1990.
3. N. N. Biswas, “Logic Design theory”, PHI 1990.
4. Shem, toy Levei , Ashok K.Agarwala , “Fault Tolerant System design”, Tata McGraw Hill, 1994

19UCS907	ADHOC AND SENSOR NETWORKS	L	T	P	C
		3	0	0	3

PRE-REQUISITE: NETWORKING FUNDAMENTALS

COURSE OBJECTIVES :

- To study the protocols and the functionalities of ad hoc networks
- To understand various applications developed based on ad hoc networking
- To know about sensor networks
- To learn about the security issues in ad hoc and sensor networks

UNIT I	INTRODUCTION AND MAC PROTOCOLS	9

Cellular and Ad-hoc Networks – Issues and Challenges in Ad-hoc Networks - Design Issues and Design Goals of MAC protocols for Ad-hoc Networks - Classification of MAC protocols - Contention Based Protocols – Power-Aware MAC Protocols – Reservation and Scheduling Mechanisms - Other Protocols.

UNIT II	ROUTING PROTOCOLS	9

Design Issues and Classification of Unicast and Multicast Routing Protocols - Proactive, Reactive and Hybrid Routing Protocols – Tree Based and Mesh Based Multicast Protocols, Energy Efficient and QoS Guaranteed Multicast Protocols.

UNIT III	TRANSPORT LAYER AND SECURITY ISSUES	9

Design Issues, Design Goals and Classification of Transport Layer Protocols – TCP over Ad Hoc – Security in Ad-hoc Networks – Network Security Requirements – Network Security Attacks – Key Management – Secure Routing in Ad-hoc Networks.

UNIT IV	MAC AND ROUTING IN WIRELESS SENSOR NETWORKS	9

Unique Constraints and Challenges – Advantages and Applications – Collaborative Processing – Key Definitions – Localization and Tracking – MAC – Contention – Based Protocols – Schedule – Based Protocols, Geographic, Energy Aware and Attribute Based Routing.

UNIT V	TRANSPORT, QoS AND SECURITY IN WIRELESS SENSOR NETWORKS	9

Data-centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Broadcast Authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols

TOTAL: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Identify and mitigate the design issues involved in MAC protocols. [Apply]
- Select the proper mechanism that are involved in Contention based protocols. [Apply]
- Apply the proper routing protocols in Ad-hoc networks. [Apply]
- Illustrate the various functionalities of transport layer and security issues in Ad-hoc networks. [Apply]
- Employ various types of routing techniques that involved in wireless sensor networks. [Apply]
- Choose the proper security measures to manage the QoS in wireless sensor networks. [Apply]

TEXT BOOKS:

1. C. Siva Ram Murthy and B.S. Manoj, ―Ad Hoc Wireless Networks – Architectures and Protocols‖, Pearson Education, Second Edition, 2005.

2. Feng Zhao and Leonidas Guibas, ―Wireless Sensor Networks – An Information Processing Approach‖, Elsevier Publications, 2004.

REFERENCES:

1. Subir Kumar Sarkar, T G Basavaraju and C Puttamadappa, ―Ad Hoc Mobile Wireless Networks‖, Auerbach Publications, 2008.

2. Holger Karl and Andreas Willig, ―Protocols and Architectures for Wireless Sensor Networks‖, John Wiley and Sons, 2009.

3. Erdal Cayirci and Chunming Rong, ―Security in Wireless Ad Hoc and Sensor Networks‖, John Wiley and Sons, 2009.

4. C.K. Toh, ―Adhoc Mobile Wireless Networks – Protocols and Systems‖, Pearson Education, First Edition, 2002.

5. George Aggelou, ―Mobile Adhoc Networks – From Wireless LANs to 4G Networks‖, Tata McGraw Hill, 2009.

19UCS908	COMPUTER GRAPHICS	L	T	P	C
		3	0	0	3

PRE-REQUISITE: Introduction to Computer Graphics and Problem Solving

COURSE OBJECTIVES :

- To Study the Two Dimensional Transformations and Viewing.
- To impart the knowledge of 3D geometric Transformations and Viewing
- To know about the Illumination Models and Self Similarity.
- To acquire the knowledge of Color Models
- To design 2D and 3D Animations

UNIT I	2D GEOMETRIC TRANSFORMATIONS AND VIEWING	10

Output Primitives- Points and lines, Line drawing algorithms- Attributes of output primitives – 2D-Transformations: Basic transformation-Other Transformations- Transformation between Coordinate Systems- 2D Viewing –The Viewing Pipeline – Window to Viewport Coordinate Transformation - Line Clipping Algorithm-Polygon Clipping – Text Clipping- Exterior Clipping

UNIT II	3D GEOMETRIC TRANSFORMATIONS AND VIEWING	10

3-D Geometric Concepts, 3-D Object representations- Polygon Surfaces, Curved Lines and Surfaces, Quadric Surfaces and Spline Representation-Visualization of Datasets- 3-D Geometric Modeling and Transformations - 3-D Viewing- Viewing Pipeline - 3D Clipping -Visible Surface Detection Methods

UNIT III	ILLUMINATION MODELS AND FRACTALS	9

Shading Models- Light Sources- Illumination Model- Constant -Intensity Shading- Gouraud shading, Phong Shading, Fast Phong Shading- Texture Mapping- Procedural Texturing Methods- Fractals: Fractal Geometry Methods- Fractal –Generation Procedure-Classification of Fractals- Fractal Dimension- Geometric Construction – Affine Fractal- Julia Sets

UNIT IV	COLOR MODELS	8

Properties of Light- Intuitive Color Concepts- RGB Color Model, YIQ Color Model, CMY Color Model, HSV Color Model, Conversion between HSV and HLS Color Model- Color Selection and Applications.

UNIT V	COMPUTER ANIMATION	8

Design of Animation Sequences-General-Computer Animation Functions- Raster Animations-Computer- Animation Languages, Key-Frame Systems, Morphing- Simulating Accelerations- Motion Specifications-Drawing 3D Scenes-Special Effects

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply 2D transformations to get desired 2D Object.[Apply]
- Apply 3D transformations to obtain desired 3D object.[Apply]
- Apply appropriate Illumination Models based on the object[Apply]
- Create Fractals using Geometric Methods[Apply]
- Choose appropriate Color Models to apply 2D/3D image based on the given object[Apply]
- Use Animations to create interactive graphics.[Apply]

Text Books

1. Donald Hearn and M.Pauline Baker, “Computer Graphics”, 2nd Edition, Pearson Education, Prentice Hall,2004.
2. C. Foley, VanDam, Feiner and Hughes, “Computer Graphics Principles & Practice and Practice in C”, 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9.

REFERENCES BOOK:

1. W. M. Newman, R. F. Sproull– “Principles of Interactive computer Graphics” – 2nd Edition, 1997, Tata MCGraw Hill.
2. Donald Hearn and M Pauline Baker“Computer Graphics with OpenGL”, 4th Edition, 2013, Pearson education.

19UCS909	DATA MINING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To impart the knowledge about the basics of data mining , data mining functionalities, and Preprocessing concepts.
- To analyze and implement the Association Rules for analyzing the Transactional Databases
- To Study and Implement the major Classification and Clustering Algorithms
- To Study the advanced data mining concepts.

UNIT I	INTRODUCTION TO DATA MINING AND PRE-PROCESSING	12

Introduction: Motivation and Importance of Data Mining - Data Mining - Kind of Data to be mined - Data Mining Functionalities - Kind of patterns to be mined - Classification of Data Mining Systems - Integration of a Data Mining System with a Database - Major Issues in Data Mining.

Data Pre-processing: The need for Preprocessing - Data Cleaning - Data Integration and Transformation - Data Reduction - Data Discretization and Concept Hierarchy Generation.

UNIT II	ASSOCIATION RULE MINING	9

Association Rules: problems Definition - Frequent Item Set Generation - The APRIORI Principle - Support and Confidence Measures - Association Rule Generation - APRIOIRI Algorithm - The Partition Algorithms - FP - Growth Algorithms - Compact Representation of Frequent Item set - Maximal Frequent Item Set - Closed Frequent Item Sets.

UNIT III	DATA CLASSIFICATION	8

Classification: Problem Definition - Evaluation of classifiers - Classification Techniques, Decision Selecting the Best Split - Algorithm for Decision tree Induction - Naive Bayes Classifier - Bayesian Belief Networks – K - Nearest neighbor classification.

UNIT IV	CLUSTERING OF DATA	8

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – K- means– Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis

UNIT V	ADVANCED MINING AND ITS APPLICATIONS	8

Advanced Mining: Multimedia Data Mining - Text Mining - Mining the World Wide Web -Data Mining Applications - Social Impacts of Data Mining.

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Experiment with various data preprocessing techniques to solve data redundancy. (Apply)
- Make use of different patterns of data in data mining system to analyze the database.(Apply)
- Analyze the basic functionalities of data mining in order to apply it to real world scenario (Analyze)
- Implement Association Rules for analyzing Transactional databases.(Apply)
- Implement major Classification And Clustering Algorithms on various databases.(Apply)
- Analyze various Data mining techniques in real time problems.(Analyze)

TEXT BOOK:

1. Data Mining – Concepts and Techniques, 2 Edition, Jiawei Han, Micheline Kamber, 2006, Morgan Kaufmann Publishers, Elsevier.

REFERENCE BOOKS:

1. Data Mining Techniques, 3rd Edition ,Arun K Pujari,Universities Press.
2. Data Warehouse Fundamentals, PualrajPonnaiah, Wiley Student Edition.
3. Data Mining, VikaramPudi, P Radha Krishna, Oxford University Press

19UCS910	NEURAL NETWORKS AND DEEP LEARNING	L	T	P	C
		3	0	0	3

PRE-REQUISTE: Machine Learning, Artificial Intelligence

COURSE OBJECTIVES :

The student should be made to:

- To understand the concepts of neural networks and Artificial neural networks.
- To understand convolutional networks and sequence modeling.
- To study probabilistic models and auto encoders.
- To expose the students to various deep generative models.
- To study the various applications of deep learning.

UNIT I	INTRODUCTION TO NEURAL NETWORKS	9

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT II	ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS	9

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

UNIT III	CONVOLUTIONAL NETWORKS AND SEQUENCE MODELLING	9

Introduction to Deep leaning - Convolutional Networks – Convolution operation – Motivation Pooling – Basic Convolution function – Algorithms – Recurrent and recursive nets : Recurrent neural networks – Bidirectional RNN – Recursive Neural networks – Auto regressive networks – Long term dependencies – Temporal dependencies – Approximate search.

UNIT IV	PROBABILISTIC MODELS AND AUTO ENCODERS	9

Structured Probabilistic models : Challenges of unstructured modelling – using graphs to describe model structure – Learning about dependencies – inference – Deep learning approach – Monte carlo models – Linear Factor models and Auto encoders

UNIT V	DEEP GENERATIVE MODELS AND APPLICATIONS	9

Restricted Boltzmann Machines – Deep Belief networks – Deep Boltzmann machine – Convolutional Boltzmann machine- Speech, Audio and Music processing – Language modelling and Natural language processing – information retrieval – object recognition and computer vision – Multi modal and multi task learning

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the knowledge of neural network for an application to the solution of complex engineering problems. (Apply)
- Apply the knowledge of Supervised learning and unsupervised learning to the solution of complex engineering problems. (Apply)
- Apply the knowledge of complex engineering problems for convolutional networks and sequence modelling techniques. (Apply)
  Apply the knowledge of probabilistic models and auto encoders for computer applied complex engineering problems. (Apply)
- Apply the knowledge of deep generative models for problem solving of complex engineering problems. (Apply)
- Design solutions for computer applied complex engineering problems of deep learning algorithms and solve real-world problems. (Create)

TEXT BOOKS:

1. Laurene Fausett, "Fundamentals of Neural Networks" ,Pearson Education,2004.
2. Yoshua Bengio and Ian J.Goodfellow and Aaron Courville, "Deep Learning", MIT Press, 2015

REFERENCE BOOKS:

1. Li Deng, Dong Yu, "Deep Learning: Methods and Applications", now publishers, 2014
2. Simon Haykin, "Neural Networks- A comprehensive foundation", Pearson Education, 2003.
3. Yegnanarayana, B. Artificial neural networks. PHI Learning Pvt. Ltd., 2004.
4. S.N.Sivanandam, S.Sumathi,S. N. Deepa "Introduction to Neural Networks using MATLAB 6.0", TATA Mc Graw Hill, 2006.

19UCS911	SPEECH AND NATURAL LANGUAGE PROCESSING	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To learn the fundamentals of natural language processing
- To understand the use of CFG and PCFG in NLP
- To understand the role of semantics of sentences and pragmatics
- To apply the NLP techniques to IR applications

UNIT I	INTRODUCTION	9

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT II	WORD LEVEL ANALYSIS	9

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT III	SYNTACTIC ANALYSIS	9

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs – Feature structures, Unification of feature structures.

UNIT IV	SEMANTICS AND PRAGMATICS	10

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods

UNIT V	DISCOURSE ANALYSIS AND LEXICAL RESOURCES	8

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC)

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Identify any given text with basic Language features(Apply)
- Design an innovative application using NLP components(Apply)
- Implement a rule based system to tackle morphology/syntax of a language(Apply)
- Design a tag set to be used for statistical processing for real-time applications(Apply)
- Build different strategies to create various NLP applications(Apply)
- 6. Employ different statistical approaches for different types of NLP applications. (Apply)

TEXT BOOKS:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition, OReilly Media, 2009.

REFERENCE BOOKS:

1. Breck Baldwin, —Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.
2. Richard M Reese, —Natural Language Processing with Java, OReilly Media, 2015.
3. NitinIndurkhya and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
4. Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

19UCS912	DATA ANALYTICS	L	T	P	C
		3	0	0	3

PRE-REQUISITE: Database Management Systems

COURSE OBJECTIVES :

The Student should be made to:

- Be exposed to big data
- Learn the different ways of Data Analysis
- Be familiar with data streams
- Learn the mining and clustering
- Be familiar with the visualization

UNIT I	INTRODUCTION	9

Introduction to Big Data Platform – Challenges of conventional systems - Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting - Modern data analytic tools, Data management and indexing, Measures of central tendency, Measures of location of dispersions.

UNIT II	DATA ANALYSIS	9

Basic analysis techniques ,Statistical hypothesis generation and testing, Chi-Square test, t-Test, Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT III	MINING DATA STREAMS	9

Introduction to Streams Concepts – Stream data model and architecture - Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window - Realtime Analytics Platform(RTAP) applications - case studies - real time sentiment analysis, stock market predictions.

UNIT IV	FREQUENT ITEMSETS AND CLUSTERING	9

Mining Frequent item sets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent item sets in a stream – Clustering Techniques – Hierarchical – K- Means Regression analysis, Classification techniques, Clustering, Association rules analysis

UNIT V	FRAMEWORKS AND VISUALIZATION	9

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques, interaction techniques, Case Study and

Projects : Understanding business scenarios, Feature engineering and visualization.

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply fundamental algorithmic ideas to process data (Apply)
- Apply the analytic algorithms to solve problems. (Apply)
- Apply stream data model in real time applications. (Apply)
- Apply data mining techniques for analyzing the big data applications (Apply)
- Handle large scale analytics projects using different frameworks (Create)
- Build a complete business data analytics solution (Create)

TEXT BOOKS:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.

2. AnandRajaraman and Jeffrey David Ullman, Mining of Massive Datasets,Cambridge University Press, 2012.

REFERENCE BOOKS:

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analystics, John Wiley & sons, 2012.

2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O" Reilly, 2011.

3. Jiawei Han, MichelineKamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier, Reprinted 2008.

19UCS913	INFORMATION RETRIEVAL	L	T	P	C
		3	0	0	3

PRE-REQUISITE: COMPUTER PROGRAMMING

COURSE OBJECTIVES :

- To learn the information retrieval models.
- To familiarize the concepts in Web Search Engine.
- To impart the knowledge of link analysis.
- To explain document text mining techniques.

UNIT I	INTRODUCTION	9

Introduction –Basic IR system Architecture –Other search Applications-Other IR search Applications-Working with Electronic Text-Open source Search engine Frameworks –Lucene,Indiri,Wumpus.

UNIT II	INFORMATION RETRIEVAL MODELS	9

Boolean and vector-space retrieval models- Term weighting - TF-IDF weighting-Language Model based IR - Probabilistic IR – Relevance feedback and query expansion.

UNIT III	WEB SEARCH ENGINE – CRAWLING AND INDEXING	9

Web search overview, web structure, search engine – Web Search Engine Architecture - crawling the web-crawling Documents and email- web indexes –- Index Compression-Index Construction.

UNIT IV	WEB SEARCH – LINK ANALYSIS	9

Link Analysis –hubs and authorities – Page Rank algorithms -Searching and Ranking-Queries and users-Static ranking-Dynamic ranking-Evaluating web search.

UNIT V	DOCUMENT TEXT MINING	9

Text Mining -Text classification and clustering - Categorization algorithms: naive Bayes and nearest neighbor – Clustering algorithms: Flat Clustering-Clustering in information retrieval; k-means; Model based Clustering.

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the importance of IR (Understand)

- Identify the suitable Information Retrieval models for retrieving the Data for a given Application (Apply)
- Apply Crawling and Indexing Techniques to search web pages. (Apply)
- Apply Link Analysis and Ranking in web search for the effective Document Retrieval. (Apply)
- Apply Document Text Mining Technique for Categorizing the Documents. (Apply)

TEXT BOOKS:

1. C.Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval, CambridgeUniversity Press, 2008.
2. Ricardo Baeza -Yates and BerthierRibeiro - Neto, Modern Information Retrieval: The Concepts and Technology behind Search 2nd Edition, ACM Press Books 2011.

REFERENCE BOOKS:

1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
2. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009.
3. Ophir Frieder “Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series “,2ndEdition, Springer, 2004.
4. Manu Konchady, “Building Search Applications: Lucene, Ling Pipe”, and First Edition, Gate Mustru Publishing, 2008.
5. Mark Levene, An Introduction to Search Engines and Web Navigation, 2nd Edition Wiley, 2010.

19UCS914	EXPERT SYSTEMS	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- Develop abilities to apply, build and modify decision models to solve real problems
- Explore the issues involved in the design and development of Expert Systems and discuss the role these systems play in the business environment.

UNIT I	INTRODUCTION	9

The meaning of an expert system, problem domain and knowledge domain, the advantages of an expert system, general stages in the development of an expert system, general characteristics of an expert system, history and uses of expert systems today, rule-based expert systems, procedural and nonprocedural paradigms, characteristics of artificial neural systems. -The study of logic, difference between formal logic and informal logic, meaning of knowledge, how knowledge can be represented, semantic nets, how to translate semantic nets into PROLOG, limitations of semantic nets, schemas, frames and their limitations, how to use logic and set symbols to represent knowledge, the meaning of propositional and first order predicate logic, quantifiers, imitations of propositional and predicate logic.

UNIT II	METHODS OF INFERENCE	9

Trees, lattices, and graphs, state and problem spaces, AND-OR trees and goals, methods of inference, rules of inference, limitations of propositional logic, logic systems, resolution rule of inference, resolution systems, and deduction, shallow and causal reasoning, applying resolution to first-order predicate logic, forward and backward chaining, additional methods of reference, Meta knowledge, the Markov decision process

UNIT III	CLASSICAL PROBABILITY	9

The meaning of uncertainty and theories devised to deal with it, types of errors attributed to uncertainty, errors associate, with induction, features of classical probability, experimental and subjective probabilities, compound and conditional probabilities, hypothetical reasoning and backward induction, temporal reasoning, Markov chains, odds of belief, sufficiency and necessity, role of uncertainty in inference chains, implications of combining evidence, role of inference nets in

expert systems, how probabilities are propagated.

UNIT IV	FUZZY EXPERT SYSTEMS	9

Sources of uncertainty in rules, methods of dealing with uncertainty, Dempster-Shafer theory, theory of uncertainty based on fuzzy logic, commercial applications of fuzzy logic. How to select an appropriate problem, the stages in the development of an expert system, types of errors to expect in the development stages, the role of the knowledge engineer in the building of expert systems, the expected life cycle of an expert system, how to do a life cycle model.

UNIT V	APPLICATION OF EXPERT SYSTEMS	9

Information management, Hospitals and medical facilities, Help desks management, Employee performance evaluation, Loan analysis, Virus detection, Useful for repair and maintenance projects, Warehouse optimization, Planning and scheduling, The configuration of manufactured objects, Financial decision making Knowledge publishing, Process monitoring and control, Supervise the operation of the plant and controller, Stock market trading, Airline scheduling & cargo schedules

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Develop the skills to gain a basic understanding of Expert Systems .(Create)
- Explore the functional components of Expert systems.(Understand)
- Describe the typical architecture of an expert system and contrast alternative ways of representing knowledge .(Understand)
- Apply, and implement uninformed and informed search techniques to solve problems.(Apply)
- Ability to design and develop Hybrid **expert system** for real world problems. (Understand)

TEXT BOOKS:

1. J. Giarratano and G. Riley, "Expert Systems -- Principles and Programming". 4th Edition, PWS Publishing Company, 2004.

2. Durkin, J., Expert systems Design and Development, Macmillan, 1994

REFERENCE BOOKS:

1.Elias M. Awad, Building Expert Systems, West Publishing Company 1996 B.Tech (Computer Science and Engineering) Syllabus for Admission Batch 2015-16 8 th Semester

2. Peter Jackson, Introduction to Expert Systems, Addison Wesley Longman, 1999.ISBN 0-20187686-8.

3. Gonzalez and D. Dankel, "The Engineering of Knowledge-Based Systems", Prentice Hall, 1994.

4.Nikolopoulos, "Expert Systems", Marcel Dekker Inc. 1997. ISBN 0 8247 9927 5

19UCS915	IMAGE PROCESSING	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To introduce the various Image Processing Techniques and their applications
- To study the Spatial and Frequency domains for image enhancement
- To familiarize the methods of Compression methodologies in digital Images.
- To acquire the knowledge of segmentation in digital Images.
- To study the methods of Morphological Operations

UNIT I	INTRODUCTION TO IMAGE PROCESSING	9

Introduction: Fundamental steps in digital image processing, Components, Digital Image representation, Sampling & Quantization, Image acquisition, Representing digital pixels, Distance Measures, simple image formation, Image sampling and Quantization, Image quality, Introduction to colour image – RGB and HSI Models.

UNIT II	IMAGE ENHANCEMENT IN SPATIAL DOMAIN	10

Introduction to image enhancement, basic grey level transforms, Histogram, Histogram-processing equalization, Matching & color histogram, Enhancement using arithmetic/logic operations, spatial filtering, Smoothing spatial filtering, Sharpening spatial filtering.

UNIT III	IMAGE ENHANCEMENT IN FREQUENCY DOMAIN	9

Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.

UNIT IV	IMAGE COMPRESSION AND SEGMENTATION	10

Image Compression: Fundamentals, Image compression models, Error free compression, Lossy compression.

Image Segmentation: Point, Line and Detection of discontinuities, Edge linking and boundary detection, Region based segmentation, Thresholding, Otsu's method.

UNIT V	MORPHOLOGICAL OPERATIONS	7

Morphological-dilation and erosion, opening and closing, Hit/ miss transforms, Representation Boundary descriptors, Regional descriptors.

TOTAL: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the fundamental concepts in Digital Image Processing [Understand]
- Apply spatial domain processing in digital images.[Apply]
- Apply Frequency domain processing in digital Images.[Apply]
- Compute appropriate Compression methods for Digital Images[Apply]
- Employ segmentation algorithms to segment the images.[Apply]
- Compute Morphological Operations in given image for image enhancement[Apply]

TEXT BOOKS

1.R.C. Gonzalez, R.E. Woods; Digital Image Processing (2nd edition), Prentice Hall, 2002, ISBN 0201180758.

REFERENCES BOOK:

1. R. D. Boyle, R. C. Thomas; Computer vision : a first course, Blackwell Scientific, 1988, ISBN 0632015772.

2.C. R. Giardina, E. R. Dougherty. Morphological Methods in Image and Signal Processing. Prentice-Hall, Englewood Cliffs, New Jersey, 1988.

19UCS916	INTRODUCTION TO DIGITAL SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURS E OBJECTIVES :

- To introduce discrete Fourier transform and its applications.
- To teach the design of infinite and finite impulse response filters for filtering undesired signals.
- To introduce signal processing concepts in systems having more than one sampling frequency.

UNIT I	SIGNALS AND SYSTEMS	9

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution – Correlation.

UNIT II	FREQUENCY TRANSFORMATIONS	9

Introduction to DFT – Properties of DFT – Circular Convolution - Filtering methods based on DFT – FFT Algorithms - Decimation – in – time Algorithms, Decimation – in – frequency Algorithms – Use of FFT in Linear Filtering – DCT – Use and Application of DCT.

UNIT III	IIR FILTER DESIGN	9

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Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation.

UNIT IV	FIR FILTER DESIGN	9

Structures of FIR – Linear phase FIR filter – Fourier Series - Filter design using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques

UNIT V	FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS	9

Binary fixed point and floating point number representations – Comparison - Quantization noise – truncation and rounding – quantization noise power- input quantization error- coefficient quantization error – limit cycle oscillations-dead band- Overflow error-signal scaling.

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Analyze the perform of frequency transforms for the signals.
- Design IIR and FIR filters.
- . Employ signal processing strategies at multidisciplinary team activities.
- Analyze the spectral parameter of window functions
- Understand the applications of DSP in speech processing and spectrum analysis.

TEXT BOOK:

1. John G. Proakis and Dimitris G.Manolakis, “Digital Signal Processing – Principles, Algorithms Applications”, Fourth Edition, Pearson Education, Prentice Hall, 2007.

REFERENCES:

1. Emmanuel C.Ifeachor, and Barrie.W.Jervis, “Digital Signal Processing”, Second Edition, Pearson Education, Prentice Hall, 2002.
2. Sanjit K. Mitra, “Digital Signal Processing – A Computer Based Approach”, Third Edition, Tata Mc Graw Hill, 2007.
3. A.V.Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.
4. Andreas Antoniou, “Digital Signal Processing”, Tata McGraw Hill, 2006.

19UCS917	HUMAN COMPUTER INTERACTION	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURS E OBJECTIVES :

- To learn the foundations of Human Computer Interaction.
- To become familiar with the design technologies for individuals and persons with disabilities.
- To be aware of mobile HCI.
- To learn the guidelines for user interface.

UNIT I	FOUNDATIONS OF HCI	9

The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

UNIT II	DESIGN & SOFTWARE PROCESS	9

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT III	MODELS AND THEORIES	9

Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models- Task analysis -Dialog notations and design-Model of system.

UNIT IV	MOBILE HCI	9

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools-Case Studies

UNIT V	WEB INTERFACE DESIGN	9

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Design effective dialog for HCI(Apply)
- Implement effective HCI software process for real time entities. (Apply)
- Practice a variety of simple methods for evaluating the quality of a user interface.(Apply)
- Develop user interface for mobile applications. (Create)
- Apply appropriate HCI techniques to design systems that are usable by people. (Apply)
- Design interface for web based applications. (Create)

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2004(UNIT I,II&III).
2. Brian Fling, “Mobile Design and Development”, First Edition , O’Reilly Media Inc.,2009(UNIT–IV).
3. Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O’Reilly, 2009.(UNIT-V).

REFERENCE BOOKS:

1. Ben Shneiderman and Catherine Plaisant, Designing the User Interface: Strategies forEffective Human-Computer Interaction (5th Edition), 5th ed., Pearson AddisonWesley,2009.
2. Donald A. Norman, The Design of Everyday Things, Basic Books, 2002.
3. Alan Cooper, About Face 3: The Essentials of Interaction Design, 3rd edition, Wiley 2007.
4. Jenny Preece, Yvonne Rogers, and Helen Sharp: Interaction Design: Beyond Human-Computer Interaction, 3nd ed., Wiley, 2011.

19UCS918	BLOCKCHAIN TECHNOLOGY	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES:

- To understand what Blockchain is and its importance.
- To understand the various layers of blockchain
- To discuss various real-time use cases
- To understand components of blockchain
- To understand the working mechanism of Bitcoin
- To know how ethereum helps in creating business blockchain
- To build an ethereumDApp

UNIT I	INTRODUCTION TO BLOCKCHAIN	9

What is Blockchain – Centralized Vs. Decentralized Systems – Layers of Blockchain – Why is Blockchain Important – Blockchain uses and Use Cases - Blockchain foundation – Cryptography – Game Theory – Merkle Trees – Properties of Blockchain solutions – Blockchain Transactions – Distributed Consensus Mechanisms – Blockchain Applications – Scaling Blockchain

UNIT II	HOW BITCOIN WORKS	9

History of Money – Dawn of Bitcoin – The Bitcoin Blockchain – The Bitcoin Network – Bitcoin Scripts – Full Nodes vs SPVs – Bitcoin Wallets

UNIT III	HOW ETHEREUM WORKS	9

From Bitcoin to Ethereum – Ethereum Blockchain – Merkle Patricia Tree – RLP Encoding – Ethereum Transaction and Message Structure – State Transaction Function – Gas and Transaction Cost – Smart Contracts – Ethereum Virtual Machine – Ethereum Ecosystem : Swarm – Whisper – DApp – Development Components.

UNIT IV	ENTERPRISE BLOCKCHAIN	9

Blockchain Vs Distributed Databases, How does an enterprise view blockchain?, Types of blockchain technology, what is blockchain in business?, Blockchain for business – how does the blockchain work?, Business benefits of blockchain, Example use cases, Challenges in enterprise

adoption, Hyperledger, Corda, Example Enterprise Applications.		
UNIT V	**HANDS-ON PROJECTS : BUILDING ETHEREUM DAPP**	**9**
DApp – Setting up a Private Ethereum Network: Install go-etherum – Create geth Data directory – Create a geth account – create genesis.json configuration File – Run the first Node of the Private Network – Run the second node of the Network – Creating Smart Contract – Deploying the Smart Contract – Client Application **TOTAL:45Periods**		

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Understand the various layersBlockchain is and its importance.
- Discuss various real-time use cases
- Describe the components of blockchain and the working mechanism of Bitcoin
- Remember how ethereum helps in creating business blockchain
- Build an ethereumDApp

TEXT BOOKS:

1. Beginning Blockchain – A Beginner's Guide to Building Blockchain Solutions, Authors :Bikramaditya Singhal, Gautam Dhameja and Priyansu Sekhar Panda, Apress Publication
2. Blockchain for the Enterprise: The definitive guide to adoption of blockchain in the enterprise, Author &Publisher : Manav Gupta, ISBN-10: 1999387104

REFERENCE BOOKS:

1. The Truth Machine – The Blockchain and the Future of Everything, Authors: Michael J. Casey and Paul Vigna, St.Martin's Press
2. Mastering Bitcoin – Programming the Open Blockchain, Author: Andreas M. Antonopoulos, O'Reilly Publication

19UCS919	CYBER SECURITY	L	T	P	C
		3	0	0	3

PRE-REQUISITE: Basic Knowledge of Computers, Networking and Internet and Windows Operating System.

COURSE OBJECTIVES :

The Student should be made to:

- The course has been designed to give students an extensive overview of cyber security issues, tools and techniques that are critical in solving problems in cyber security domains.
- To provide the concepts of computer security, cryptography, digital money, secure protocols, detection and other security techniques.
- Identify the various essential techniques, control mechanisms in protecting Information Systems, IT infrastructure, analysing and monitoring potential threats, attacks and implementing security solutions.
- Become Knowledgeable about the best practices related to cyber security, regulations and laws associated with the same.
- The students will also have a wider perspective to information security from national security perspective from both technology and legal perspective.

UNIT I	INTRODUCTION TO CYBER SECURITY CONCEPTS	9

Introduction to Information Systems, Types of Information Systems, Development of Information Systems, Introduction to Information Security, Need for Information Security.

Essential Terminologies: CIA, Risks, Breaches, Threats, Attacks, Exploits. Information Gathering (Social Engineering, Foot Printing & Scanning),Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

Open Source/ Free/ Trial Tools: nmap, zenmap, Port Scanners, Network scanners.

UNIT II	CRYPTOGRAPHY AND CRYPTANALYSIS	9

Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security, Security Protocols: - security at the Application Layer-PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPsec.

Open Source/ Free/ Trial Tools: Implementation of Cryptographic techniques, OpenSSL, Hash Values Calculations MD5, SHA1, SHA256, SHA 512, Steganography (Stools).

UNIT III	INFRASTRUCTURE AND NETWORK SECURITY	9

Introduction to System Security, Server Security, OS Security, Physical Security, Introduction to Networks, Network packet Sniffing, Network Design Simulation. DOS/ DDOS attacks. Asset

Management and Audits, Vulnerabilities and Attacks. Intrusion detection and Prevention Techniques, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation.

Open Source/ Free/ Trial Tools: DOS Attacks, DDOS attacks, Wireshark, Cain &abel, iptables/ Windows Firewall, snort, suricata, fail2ban.

UNIT IV	CYBER LAWS AND FORENSICS	9

Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013. Introduction to Cyber Forensics, Need of Cyber Forensics, Cyber Evidence, Documentation and Management of Crime Sense, Image Capturing and its importance, Partial Volume Image, Web Attack Investigations, Denial of Service Investigations, Internet Crime Investigations, Internet Forensics, Steps for Investigating Internet Crime, Email Crime Investigations.

Open Source/ Free/ Trial Tools: Case Studies related to Cyber Law, Common Forensic Tools like dd, md5sum, sha1sum, Ram dump analysis, USB device

UNIT V	SECURITY IN EVOLVING TECHNOLOGY	9

Biometrics, Mobile Computing and Hardening on android and ios, IOT Security, Web server configuration and Security. Introduction, Basic security for HTTP Applications and Services, Basic Security for Web Services like SOAP, REST etc., Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges.

Open Source/ Free/ Trial Tools: adb for android, xcode for ios, Implementation of REST/ SOAP web services and Security implementations.

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the basic and advanced cyber securities information system. **(Understand)**
- Apply the cyber security operations (technologies) to simulate different applications, security practices and System security standards. **(Apply)**
- Apply cyber security threats and vulnerabilities in Information Systems and security measures to real time scenarios. **(Apply)**
- Analyze and resolve cyber security issues in networks and computer systems to secure an IT infrastructure. **(Analyze)**
- Develop cyber policies and procedures to manage enterprise cyber security risks and communicate the human role in security systems. **(Create)**
- Work individually or in teams and demonstrate the solutions to the given exercises through cyber security tools. **(Affective Domain)**

TEXT BOOKS:

1. William Stallings, “Cryptography and Network Security”, Pearson Education/PHI, 2006.
2. V.K. Jain, “Cryptography and Network Security”, Khanna Publishing House.

3. Gupta Sarika, “Information and Cyber Security”, Khanna Publishing House, Delhi.
4. Charles P. Pfleeger, Shari LawerancePfleeger, “Analysing Computer Security”, Pearson Education India.
5. AtulKahate, “Cryptography and Network Security”, McGraw Hill.

REFERENCE BOOKS:

1. V.K.Pachghare, “Cryptography and information Security”, PHI Learning Private Limited, Delhi India.
2. V.K. Jain, “Cryptography and Network Security”, Khanna Publishing House.
3. Nina Godbole, “Information System Security”, Wiley
4. Bothra Harsh, “Hacking”, Khanna Publishing House, Delhi.
5. Sarika Gupta &Gaurav Gupta, Information Security and Cyber Laws, Khanna Publishing House
6. AnshulKaushik, Cyber Security, Khanna Publishing House
7. Dr.SuryaPrakashTripathi, RitendraGoyal, Praveen Kumar Shukla ,”Introduction to Information Security and Cyber Law” Willey Dreamtech Press.
8. Mike Chapple and David Seidl "Cyberwarfare: Information operations in a connected world" Jones & Bartlett Learning
9. CHANDER, HARISH,” Cyber Laws And It Protection ” , PHI Learning Private Limited ,Delhi
10. http://www.ignou.ac.in/upload/Announcement/programmedetails.pdf

19UCS920	MULTICORE PROGRAMMING	L	T	P	C
		3	0	0	3
PRE-REQUISITE: COMPUTER ORGANIZATION AND ARCHITECTURE					

COURSE OBJECTIVES :

- To introduce the concepts of programming in parallel processors.
- To review the challenges in parallel and multi-threaded programming.
- To give an idea about the parallel programming paradigms.
- To give knowledge on multicore programs and design parallel solutions.

UNIT I	**INTRODUCTION TO MULTIPROCESSORS AND SCALABILITY ISSUES**	**9**

Scalable design principles – Principles of processor design – Instruction Level Parallelism, Thread level parallelism. Parallel computer models –- Symmetric and distributed shared memory architectures – Performance Issues – Multi-core Architectures - Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture.

UNIT II	**PARALLEL PROGRAMMING**	**9**

Fundamental concepts – Designing for threads – Threading and parallel programming constructs – Synchronization – Critical sections – Deadlock. Threading APIs.

UNIT III	**OPENMP PROGRAMMING**	**9**

OpenMP – Threading a loop – Thread overheads – Performance issues – Library functions. Solutions to parallel programming problems – Data races, deadlocks and live locks – Non-blocking algorithms – Memory and cache related issues.

UNIT IV	**MPI PROGRAMMING**	**9**

MPI Model – collective communication – data decomposition – communicators and topologies – point-to-point communication – MPI Library.

UNIT V	**MULTITHREADED DEBUGGING TECHNIQUES**	**9**

General Debug Techniques, Debugging Multi-threaded Applications in Windows: Threads Window, Trace points, Breakpoint Filters, Naming Threads, Multi-threaded Debugging Using GDB..

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply processor design principles in architecture design.(Apply)
- Identity the issues in programming parallel processor. (Apply)
- Apply thread concepts in parallel programming constructs.(Apply)
- Develop parallel programming using openMP.(Create)
- Create standard message-passing algorithms in MPI.(Create)

- Apply debugging techniques in multithreaded applications.(Apply)

TEXT BOOKS:

1. ShameemAkhter and Jason Roberts, “Multi-core Programming”, Intel Press, 2006.
2. Michael J Quinn, Parallel programming in C with MPI and OpenMP, Tata Macgraw Hill, 2003.
3. Peter S Pacheco, An Introduction to Parallel Programming, Morgan Kaufmann, 2011.

REFERENCE BOOKS:

1. John L. Hennessey and David A. Patterson, “ Computer architecture – A quantitative approach”, Morgan Kaufmann/Elsevier Publishers, 4th. edition, 2007.
2. David E. Culler, Jaswinder Pal Singh, “Parallel computing architecture : A hardware/ software approach” , Morgan Kaufmann/Elsevier Publishers, 1999.
3. Wesley Petersen and Peter Arbenz, “Introduction to Parallel Computing”, Oxford University Press, 2004.
4. Darryl Gove, “Multicore Application Programming: For Windows, Linux, and Oracle Solaris”,Pearson, 2011.

19UCS921	INFORMATION STORAGE MANAGEMENT	L	T	P	C
		3	0	0	3
PRE-REQUISITES:					

COURSE OBJECTIVES :

- Evaluate storage architecture; understand logical and physical components of Storage Infrastructure including storage subsystems.
- Describe storage networking technologies such as FC-SAN, NAS, IP-SAN anddata archival solution.
- To impart the knowledge of Backup and Archive in virtualized and non-virtualized environment

UNIT I	STORAGE SYSTEMS AND DATA CENTER ENVIRONMENT	9

Introduction to information storage - evolution of storage architecture-Data Center Infrastructure Core element of a Data center, key data center elements, Managing a Datacenter , virtualization, and cloud computing - Data center environment - Details key data center elements – host (or compute),connectivity, storage, VMware ESXI-RAID - RAID implementation methods, techniques, and levels - Intelligent storage system - Details components of intelligent storage systems-virtual storage provisioning –EMC Symmetric and VNX.

UNIT II	STORAGE NETWORKING TECHNOLOGIES	9

Fiber Channel Storage Area Network (FC SAN) - FC SAN components, connectivity, protocol stack and Zoning and Topologies-IP SAN and FCoE -iSCSI components, Host Connectivity and Topologies and Protocol Stack-Network Attached Storage (NAS) – File Systems and Network File sharing technology, Components of NAS,NAS Implementations, NAS File Sharing Protocols-EMC VNX Gateway.

UNIT III	BACKUP, ARCHIVE MANAGEMENT	9

Introduction to Business Continuity - information availability and business continuity solutions in both virtualized and non-virtualized environments. Backup and Archive - Backup and recovery in both virtualized and non-virtualized environments – De duplication technology to optimize data backups along with archival solutions to address fixed content storage requirements.

UNIT IV	REPLICATION TECHNOLOGIES	9

Local Replication - Local replications of data along with data restore and restart considerations-EMC Time Finder and EMC Snap View. Remote Replication - Remote replication technologies in virtualized and non-virtualized environments. Three-site replication and continuous data replication- EMC SRDF, EMC SAN Copy, and EMC Mirror View

UNIT V	SECURING AND MANAGING STORAGE INFRASTRUCTURE	9

Securing the Information Infrastructure - Framework and domains of storage security along with covering security implementation at storage networking. Security in virtualized and cloud environments-Managing the Information Infrastructure-threats to a storage infrastructure-storage infrastructure monitoring and management - storage tiering, information lifecycle management (ILM)-cloud service management activities-EMC Management Tools-EMC Unisphere-EMC UIM.

TOTAL:45Periods

TEXT BOOKS:

1. EMC Corporation, “Information Storage and Management”, Second Edition, May 2012. Wiley India. ISBN: 978-1-118-09483-9

REFERENCE BOOKS:

1. G. Somas Sundaram, AlokShrivastava, , ” Information Storage and Management ”, Wiley, India,.
2. Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens,” Storage Network explained: Basic and application of fiber channels, SAN, NAS, iSESI, INFINIBAND and FCOE”, Wiley, India,.
3. Marc Farley,” Building Storage Networks”, Tata McGraw Hill, , Osborne, 2001.
4. Meeta Gupta,” Storage Area Network Fundamentals”, Pearson Education Limited,2002

19UCS922	C# and.NET Framework	L	T	P	C
		3	0	0	3
PRE-REQUISITE: Object Oriented Programming, C Programming					

COURSE OBJECTIVES :

Upon completion of this course, students will be able

- To demonstrate knowledge o Object-Oriented concepts and functional requirements C#.NET application.
- To construct classes, methods and assessors and instantiate objects.
- To design and implement database connectivity using ADO.NET in window based application.

UNIT I	**OVERVIEW OF .NET**	**9**

Building blocks of .Net platform – Type system - Language specification - Type distinction – Runtime deployment - .Net aware programming languages - Independent nature of .NET

UNIT II	**CONCEPTS OF C#**	**9**

Data types – Arrays – Strings - Control Statements - Classes and Objects - this keyword – Static Keyword - Namespace - Inheritance –Interface and overloading - Polymorphism: Method Overloading - Operator Overloading – Property – Indexes – Delegates - Exception handling.

UNIT III	**FILE I/O AND OBJECTS**	**9**

File Operation - File Management Systems - Directory and file types – Programming with file I/O – Object serialization – Configuration of objects – Serialization mechanisms.

UNIT IV	**ADO.NET**	**9**

ADO.NET Architecture - ADO.NET - Connected Layer: Data Provider Model - Data Readers - Data Transaction - Disconnected Layer: Dataset - Data Column- Data RowTable Data.

UNIT V	**ASP.NET**	**9**

Building ASP.NET web pages – ASP.NET web controls – Master pages – Themes – Web service Performance- State management: Session data – Cookies.

TOTAL: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Perceive awareness of .NET Environment fundamentals and significant role of .NET in cross platform.[Understand]
- Acquire the working knowledge of C# and apply in simple programming constructs.[Apply]
- Analyze the file types and apply the serialization mechanisms in C# for configuration of objects.[Analyze]
- Apply the ADO.NET control to strap the data transactions with .NET application.[Apply]
- Construct the web pages using ASP.NET based on intrinsic controls. ([Apply]
- Design and develop profesasional console and window based .NET application.[Analyze]

TEXT BOOKS:

1. Andrew Troelsen, ―Pro C# 2010 and the .NET 4 Platform‖, 5 th Edition, APress, 2010

REFERENCE BOOKS:

1. Jesse Liberty, Donald Xie, ―Programming C# 3.0‖, 5 th Edition, O_Reilly Press, 2008.

2. Robinson et al, ―Professional C#‖, 3 rd Edition, Wrox Press, 2002.

3. Herbert Schildt, ―The Complete Reference: C#4.0‖, Tata McGraw Hill, 2012.

4. Thuan Thai, Hoang Q. Lam, ―.NET Framework Essentials‖, 3 rd Edition, O_Reilly Press, 2003.

5. Stephen C. Perry, ―Core C# and .NET‖, Pearson Education, 2009.

19UCS923	GAME PROGRAMMING	L	T	P	C

PRE-REQUISITE:

COURSE OBJECTIVES :

- To provide an in-depth introduction to technologies and techniques used in the game industry.
- To recognize the processes, mechanics, issues in game design and game engine development.
- To integrate various technologies such as multimedia, artificial intelligence and physics engine into a cohesive, interactive game application.

UNIT I	INTRODUCTION TO GAME PROGRAMMING	9

Overview of game programming, game industry - 3D Transformations, Quaternion's, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation, Physics-based Simulation, Scene Graphs.

UNIT II	GAME ENGINE ARCHITECTURE	9

Game engine architecture, Engine support systems, Resource Management and File systems, Game loop and real-time simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling.

UNIT III	GRAPHICS AND GAME PROGRAMMING	9

Graphics Device Management, Tile-Based Graphics and Scrolling, GUI programming for games - Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management.

UNIT IV	GAMING PLATFORMS AND FRAMEWORKS	9

Artificial Intelligence in games, Physics based modeling, Path finding algorithms, Collision detection - 2D and 3D Game development using Flash, DirectX, Java, Python, Game engines - Unity. DX Studio,

UNIT V	GAME DESIGN AND PROJECT MANAGEMENT	9

Game design, Differing game types, modes, and perspectives, scripting, audio engineering, Sound and Music, level design, render threading - Game project management, Game design documentation, Rapid prototyping and game testing.

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the basic concept and core architecture of Game Programming (Understand)
- Apply the concept of Graphics, AI and Physics based modeling to construct a game. (Apply)
- Analyze the game mechanics of a given game (Analyze)
- Design the game mechanics of a new game (Create)
- Apply Programming Techniques for different platform and frame work (Apply)
- Test, and evaluate the procedures of the creation, design and development of games. (Evaluate)

TEXT BOOKS:

1. Game Engine Architecture, 2nd Edition, Jason Gregory, A K Peters, 2014 ISBN 9781466560017.
2. Mike Mc Shaffrfy and David Graham, "Game Coding Complete", Fourth Edition, Cengage Learning, PTR, 2012.
3. David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" 2 nd Editions, Morgan Kaufmann, 2006.

REFERENCE BOOKS:

1. Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", 2 nd Edition Prentice Hall / New Riders, 2009.
2. 2. Eric Lengyel, "Mathematics for 3D Game Programming and Computer Graphics", 3 rd Edition, Course Technology PTR, 2011.
3. Jesse Schell, The Art of Game Design: A book of lenses, 1 st Edition, CRC Press, 2008.

19UCS924	FUZZY LOGIC	L	T	P	C

		3	**0**	**0**	**3**

PRE-REQUISITE:

COURSE OBJECTIVES :

- To introduce the concepts of Fuzzy set and Fuzzy Relation.
- To familiarize the features of Fuzzy membership function and its measures.
- To summarize the applications of Fuzzy Logic and Optimization.
- To provide comprehensive knowledge of fuzzy logic control to real time systems.

UNIT I	**INTRODUCTION : FUZZY SETS AND RELATIONS**	**9**

Classical Sets :Operations on Classical Sets, Properties of Classical (Crisp) Sets, Mapping of Classical Sets to Functions - Fuzzy Sets : Fuzzy Set operations, Properties of Fuzzy Sets.

Crisp Relations: Cardinality of Crisp Relations, Operations on Crisp Relations, Properties of Crisp Relations, Composition. Fuzzy Relations : Cardinality of Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Product and Composition, Non-interactive Fuzzy Sets. Tolerance and Equivalence Relations.

UNIT II	**FUZZY ARITHMETIC AND MEMBERSHIP FUNCTION**	**9**

Lambda-Cuts for Fuzzy Sets, Lambda-Cuts for Fuzzy Relations, Defuzzification Methods Extension Principle - Crisp Functions, Mapping and Relations, Functions of fuzzy Sets – Extension Principle, Fuzzy Transform (Mapping), Practical Considerations, Fuzzy Numbers Interval Analysis in Arithmetic, Approximate Methods of Extension - Vertex method, DSW Algorithm, Restricted DSW Algorithm, Comparisons, Fuzzy Vectors.

Features of the Membership Function, Standard Forms and Boundaries, Fuzzification, Membership Value Assignments – Intuition, Inference, Rank Ordering, Angular Fuzzy Sets, Neural Networks, Genetic Algorithms, Inductive Reasoning.

UNIT III	**FUZZY DECISION MAKING AND CLASSIFICATION**	**9**

Decision Making:Fuzzy Synthetic Evaluation, Fuzzy Ordering, Preference and consensus, Multiobjective Decision Making, Fuzzy Bayesian Decision Method, Decision Making under Fuzzy States and Fuzzy Actions.

Classification by Equivalence Relations - Crisp Relations, Fuzzy Relations. Cluster Analysis, Cluster Validity, c-Means Clustering - Hard c-Means (HCM), Fuzzy c-Means (FCM). Classification Metric, Hardening the Fuzzy c-Partition, Similarity Relations from Clustering

UNIT IV	**FUZZY RULE BASED SYSTEM & PATTERN RECOGNITION**	**9**

Natural Language, Linguistic Hedges, Rule-Based Systems - Canonical Rule Forms, Decomposition of Compound Rules, Likelihood and Truth Qualification, Aggregation of Fuzzy Rules, Graphical Techniques of Inference

Fuzzy Pattern Recognition :Feature Analysis -Partitions of the Feature Space -Single-Sample

Identification-Multifeature Pattern Recognition -Image Processing .

UNIT V	APPLICATIONS OF FUZZY LOGIC SYSTEM	9

Fuzzy Control System: Control System Design Problem -Fuzzy Engineering Process Control -Fuzzy Statistical Process Control - Industrial Applications -Fuzzy Logic Controllers – Various Industrial Applications of FLC Adaptive Fuzzy Systems -: Home heating system - liquid level control - aircraft landing- inverted pendulum –fuzzy PID control, Fuzzy based motor control– Fuzzy Optimization

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the Engineering concepts on fuzzy sets and relations. [Apply]
- Apply the concept of fuzzy membership function for problem solving. [Apply]
- Identify the various parts of fuzzy logic based decision making process[Apply]
- Apply suitable fuzzy rule based techniques for various applications. [Apply]
- Analyze the problem in nature and select the fuzzy method to find solution.[Analyze]
- Design the optimal solutions to provide solution to real world problems using fuzzy logic techniques.[Create]

TEXT BOOKS:

1. Timothy J.Ross “Fuzzy Logic with Engineering Application”,A JohnWilley and Sons Ltd, Publication,3rd Edition,2010.
2. George Klir and Bo Yuan “Fuzzy Sets and Fuzzy Logic: Theory and Applications”, Prentice Hall NJ, 1995.

REFERENCE BOOKS:

1. George J. Klir, TinaFolger A., “Fuzzy sets Uncertainty & Information”, PHI Learning Pvt. Ltd, 2010.
2. Timoty Ross, “Fuzzy Logic with Engineering Applications”, McGraw Hill,4th edition, 2016.
3. Jang J.S.R. Sun C.T & Mizutani E., “Neuro fuzzy and Soft Computing”, PHI Learning Pvt. Ltd., 2012.

19UCS925	MOBILE AND PERVASIVE COMPUTING	L	T	P	C

		3	**0**	**0**	**3**

PRE-REQUISITES:

COURSE OBJECTIVES:

- To learn the basic architecture and concepts till third generation communication systems
- To understand the latest 4G Telecommunication System Principles.
- To explore the HCI in Pervasive environment
- To apply the pervasive concepts in mobile environment

UNIT I	**INTRODUCTION**	**9**

History – Wireless communications: GSM – DECT – TETRA – UMTS – IMT – 2000 – Blue tooth, Wi-Fi, WiMAX, 3G,4G, WATM. - Mobile IP protocols -WAP push architecture-Wml scripts and applications. Data networks – SMS – GPRS – EDGE – Hybrid Wireless100 Networks – ATM – Wireless ATM.

UNIT II	**OVERVIEW OF A MODERN 4G TELECOMMUNICATIONS SYSTEM**	**9**

Introduction. LTE-A System Architecture. LTE RAN. OFDM Air Interface. Evolved Packet Core. LTE Requirements. LTE-Advanced. LTE-A in Release. OFDMA – Introduction. OFDM Principles. LTE Uplink—SC-FDMA. Summary of OFDMA.

UNIT III	**PERVASIVE CONCEPTS AND ELEMENTS**	**9**

Technology Trend Overview - Pervasive Computing: Concepts - Challenges - Middleware - Context Awareness - Resource Management - Human–Computer Interaction - Pervasive Transaction Processing - Infrastructure and Devices - Wireless Networks - Middleware for Pervasive Computing Systems - Resource Management - User Tracking- Context Management -Service Management - Data Management - Security Management - Pervasive Computing Environments - Smart Car Space - Intelligent Campus

UNIT IV	**HCI IN PERVASIVE COMPUTING**	**9**

Prototype for Application Migration - Prototype for Multimodalities - Human–Computer Interface inPervasive Environments - HCI Service and Interaction Migration - Context- Driven HCI ServiceSelection - Interaction Service Selection Overview - User Devices - Service-Oriented MiddlewareSupport - User History and Preference - Context Manager - Local Service Matching – GlobalCombination - Effective Region - User Active Scope - Service Combination Selection Algorithm

UNIT V	**PERVASIVE MOBILE TRANSACTIONS**	**9**

Pervasive Mobile Transactions - Introduction to Pervasive Transactions - Mobile Transaction Framework - Unavailable Transaction Service - Pervasive Transaction Processing Framework - Context-Aware Pervasive Transaction Model - Context Model for Pervasive Transaction Processing - Context-Aware Pervasive Transaction Model - A Case of Pervasive Transactions - Dynamic Transaction Management - Context-Aware Transaction Coordination Mechanism - Coordination Algorithm for Pervasive Transactions - Participant Discovery - Formal Transaction Verification - Petri Net with

Selective Transition.

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply theconcepts of till Third Generation Communication systems *(*Apply)
- Explain the latest 4G Telecommunication System Principles.(Understand)
- Apply theconcepts of pervasive computing(Apply).
- Implement the HCI in Pervasive environment(Apply)
- Examine the concepts of Work on the pervasive concepts in mobile environment(Apply)
- Illustrate the different role inPervasive Transaction Processing (Apply)

TEXT BOOKS:

1. Alan Colman, Jun Han, and Muhammad Ashad Kabir, Pervasive Social Computing Socially-Aware Pervasive Systems and Mobile Applications, Springer, 2016.
2. J. Schiller, ―Mobile Communication‖, Addison Wesley, 2000.
3. Juha Korhonen, ―Introduction to 4G Mobile Communications, Artech House Publishers, 2014

REFERENCE BOOKS:

1. M. Bala Krishna, Jaime Lloret Mauri, ―Advances in Mobile Computing and Communications: Perspectives and Emerging Trends in 5G Networks‖, CRC 2016
2. Minyi Guo, Jingyu Zhou, Feilong Tang, Yao Shen, ― Pervasive Computing: Concepts, Technologies and Applications ‖ CRC Press, 2016
3. Kolomvatsos, Kostas, Intelligent Technologies and Techniques for Pervasive Computing, IGI
   Global, 2013

19UCS926	BUSINESS INTELLIGENCE AND ITS APPLICATIONS	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- Be exposed with the basic rudiments of business intelligence system
- understand the modeling aspects behind Business Intelligence
- understand of the business intelligence life cycle and the techniques used in it
- Be exposed with different data analysis tools and techniques

UNIT I	BUSINESS INTELLIGENCE	9

Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

UNIT II	KNOWLEDGE DELIVERY	9

The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization,

UNIT III	EFFICIENCY	9

Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis

UNIT IV	BUSINESS INTELLIGENCE APPLICATIONS	9

Marketing models – Logistic and Production models – Case studies.

UNIT V	FUTURE OF BUSINESS INTELLIGENCE	9

Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology. **TOT**

AL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Identify the parameters and apply the proper models to develop business intelligence systems. (Apply)
- Apply the suitable visualization techniques for knowledge discovery. (Apply)
- Employ various efficiency modeling techniques to solve real time problems. (Apply)
- Apply marketing models involved in business intelligence methods to various situations.

(Apply)

- Employ logistic and production models involved in business intelligence methods to various situations. (Apply)
- Make use of advanced technologies involved in BI for future prediction. (Apply)

TEXT BOOKS:

1. Efraim Turban, Ramesh Sharda, Dursun Delen, “Decision Support and Business Intelligence Systems”, 9th Edition, Pearson 2013.

REFERENCE BOOKS:

1. Larissa T. Moss, S. Atre, “Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making”, Addison Wesley, 2003.
2. Carlo Vercellis, “Business Intelligence: Data Mining and Optimization for Decision Making”, Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, “Business Intelligence: The Savvy Manager?s Guide”, Second Edition, 2012.
4. Cindi Howson, “Successful Business Intelligence: Secrets to Making BI a Killer App”, McGraw- Hill, 2007.
5. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, “The Data Warehouse Lifecycle Toolkit”, Wiley Publication Inc.,2007.

19UCS927	MIXED REALITY	L	T	P	C
		3	0	0	3

PRE-REQUISITE: Computer Graphics

COURSE OBJECTIVES :

- To learn the Concepts of Mixed Reality
- To impart the knowledge of Augmented Reality
- To acquire the concepts of Virtual Reality
- To study the need for content creation for AR and VR
- To understand the scope of Mixed Reality

UNIT I	Introduction to Mixed Reality	9

Introducing Virtual Reality and Augmented Reality- Mixed reality - Virtuality - Extended reality - History of Augmented Reality and Virtual Reality, Use Cases, Gaming and Entertainment, Architecture and construction, Science and Engineering, Health and medicine, Education, Mechanics of Sight, Mechanics of Hearing, Mechanics of Feeling.

UNIT II	Augmented Reality and Setup	9

Tactile and Force Feedback Devices, Display Fundamentals, Augmented Displays (Monocular, Binocular), Types of Displays, Tracking, Sensors for Tracking - Exploring the Current State of Augmented Reality - Form Factors -Considering Controllers – Current Issues with AR- Orientation and Motion, Calibration, Computer Vision, Devices to enable navigation and Interaction

UNIT III	Virtual Reality and Setup	9

VR Terminology – HMD -Immersive/Non-immersive VR, Presence, Reality trade-off, Perception Models and Processes –Virtual Systems- Interaction with Virtual Environment – Tracking and Modalities – Virtual Reality Applications

UNIT IV	Creating Content in Virtual and Augmented Reality	9

Evaluating Your Project - Assessing Your Project's Technology Needs - Choosing VR & AR – Planning Your VR & AR Project - Exploring Design Principles in VR & AR - Assessing Design Software - Capturing Real Life – Assessing Development Software - Distributing Your Content.

UNIT V	Future Scope of Mixed Reality	9

Characters, Avatars, Collaboration and Social Networking, Interaction and interaction Design, foveated rendering – VR App Development – AR App Development

Total : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Use Mixed Reality in the real time experience (Apply)

- Develop the features of AR Environment (Apply)
- Develop 3D Virtual Environments(Apply)
- Develop immersive Virtual Reality Applications(Apply)
- Implement VR and AR for content Creation(Create)
- Analyze the applications of Mixed Reality(Create)

TEXT BOOKS

1. D. SCHMALSTIEG and T. Hollerer, Augmented reality, 1st ed. Pearson Education, 2016. ISBN13: 978-0321883575.
2. 2. S. Aukstakalnis, Practical augmented reality, 1st ed. Pearson Education, 2017. ISBN-13: 9780134094236.
3. Burdea, Grigore C and Philippe Coiffet, “Virtual Reality Technology”, Wiley Interscience, India, 2003.

REFERENCES BOOK:

1. W. M. Newman, R. F. Sproull– “Principles of Interactive computer Graphics” – 2nd Edition, 1997, Tata MCGraw Hill.
2. J. Jerald, The VR Book: Human-Centered Design for Virtual Reality, 1st ed. 2016.

19UCS928	GREEN COMPUTING	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

- To learn the fundamentals of Green Computing
- To study the Green computing Grid Framework
- To understand the issues related with Green compliance
- To learn environmentally responsible business strategies

UNIT I	FUNDAMENTALS	9

Trends and reasons to go green: Overviews and issues-Current initiatives and standards - Organization planning for Green computing - Consumption Issues: Minimizing power usage – Cooling-Going paperless – recycling-Hardware consideration

UNIT II	GREENING PROCESS	9

Green Assets - Data Center design and redesign – Virtualization – Greening Information Systems: Design and development models. – Staying Green – Case Studies

UNIT III	GRID FRAMEWORK	9

Role of electric utilities, telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for green PC – Green data center – Green grid framework

UNIT IV	GREEN MODELING	9

Building a Green Device Portfolio - Finding Green Devices - Green Servers and Data Centers - Saving Energy - Reducing Greenhouse Gas Emissions

UNIT V	CASE STUDIES	9

The Environmentally Responsible Business Strategies (ERBS) – Case study scenarios for trial runs – Case studies – Applying green IT strategies and applications to a home, hospital, packaging industry and telecom sector.

TOTAL: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the green computing strategies to an organization to go green. (Apply)
- Apply various strategies to optimize the green assets of an enterprise. (Apply)
- Apply the techniques used to reduce the carbon footprint for a green data center. (Apply)
- Apply the methodologies to facilitate green grid framework. (Apply)
- Apply the energy saving and greenhouse gas emission principles to an organization. (Apply)
- Apply the Environmentally Responsible Business Strategies to various applications. (Apply)

TEXT BOOKS:

1. Toby J.Velte, Anthony T.Velte, Robert Elsen Peter, “Green IT”, McGraw Hill, 2008.
2. John Lamb, “The Greening of IT”, Pearson Education, 2009.
3. Bud E. Smith, “Green Computing: Tools and Techniques for Saving Energy, Money, and Resources”, Taylor & Francis Group, CRC Press, 2014.
4. Bhuvan Unhelkar, “Green IT Strategies and Applications-Using Environmental Intelligence”, CRC Press, June 2011.

REFERENCE BOOKS

1. Jason Harris, “Green Computing and Green IT- Best Practices on regulations & industry”, Lulu.com, 2008.
2. Carl Speshocky, “Empowering Green Initiatives with IT”, John Wiley & Sons, 2010.
3. Wu Chun Feng, “Green computing: Large Scale energy efficiency”, CRC Press, 2012.

19UCS929	ADVANCED JAVA PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To know more about the applet, awt and swing components.
- To be familiarize with RMI and network programs
- To discover how to write Java applications this can communicate with Relational Databases.
- To understand Java Servlets and their life cycle.

UNIT I	APPLET, AWT AND EVENT HANDLING	9

Applet Basics – Applet architecture – HTML APPLET tag – Passing parameter to AppletgetDocumentBase() and getCodeBase() – AWT classes and Graphics – AWT ControlsEvent Handling – Event Classes – Event Listener Interfaces – Layout Managers – Menus

UNIT II	INTRODUCING SWING & JAVA BEANS	9

Exploring Swing – JLabel and ImageIcon, JTextField – The Swing Buttons – JTabbedPane - JScrollPane, JList&JcomboBox – Trees &JTables – What Is a Java Bean? – Advantages of Java Beans – Introspection, Bound and Constrained Properties – Persistence & Customizers

UNIT III	RMI & NETWORKING	9

Remote Method Invocation –Settingup Remote Method Invocation – RMI with Applets -Networking Basics – The Networking Classes and Interfaces – InetAddress – Inet4Address and Inet6Address - TCP/IP Client sockets – URL – URL Connection – HttpURLConnection

UNIT IV	JDBC	9

Presentation to JDBC CONNECTION settings – The Concept of JDBC – JDBC Driver Types – JDBC Packages – A Brief Overview of the JDBC Process – Database Connection – Associating the JDBC/ODBC Bridge with the Database – Statement Objects – Result Set.

UNIT V	SERVLETS	9

Background, The Life Cycle of a Servlet & The JSDK-A Simple Servlet – The Servlet API -RolePlay-Servlet Concept – The javax.servlet Package – Reading Servlet Parameters, The javax.servlet.http Package – Handling HTTP Request and Responses – Using Cookies – Session Tracking.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Develop Java Applet Programming using various techniques
- Develop applications using Abstract Window Toolkit
- Design Java applications forms using swing components.
- Demonstrate RMI using Java networking classes and interfaces.
- Update and retrieve the data from the databases using JDBC-ODBC.
- Develop server side programs using Servlets.

TEXT BOOK

1. Naughton and H.Schildt, (2007), "Java 2-The complete reference", Fifth Edition McGraw Hill. (UNIT I – V)

REFERENCE BOOKS

1. Jim Keogh, (2002), "The Complete Reference J2EE", Tata McGraw Hill Edition, New Delhi.
2. Marty Hall, Larry Brown, (2004), "Core Servlets and Java Server Pages", 2nd Edition, Pearson Education.

19UCS930	XML AND WEB SERVICES	L	T	P	C
		3	0	0	3

PRE-REQUISITE: HTML

COURSE OBJECTIVES :

- To understand basics in XML.
- Understanding the concepts of web services.
- Gaining knowledge in WSDL and UDDI.
- Understanding Semantic web

UNIT I	XML TECHNOLOGY	9

Introduction -XML in context – Fundamentals of XML- DTD –XML Schemas- Integrating XML with databases - Case study – Create an XML based application and Integrate with database

UNIT II	ARCHITECTING WEB SERVICES	9

Business motivations for web services, Service oriented Architecture (SOA), Architecting Web services :Implementation ,Logical and Technological views

UNIT III	WEB SERVICES BUILDING BLOCK	9

Simple Object Access Protocol (SOAP), Web service Description Language (WSDL) ,Universal Description and Discovery Integration (UDDI), Case study : Create a Web service for a specific application using WSDL ,UDDI and SOAP concepts

UNIT IV	XML IN E – BUSINESS	9

B2B – B2C Applications – Different types of B2B interaction- Enterprise Integration – eb XML- Rosetta Net -Applied XML in vertical industry- web services for mobile devices.

UNIT V	SEMANTIC WEB	9

Semantic Web – Role of Meta data in web content- Resource Description Framework – RDF schema- Architecture of semantic web- NG – WSFL .

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the concepts of XML (Apply)
- Employ the concepts of web services(Apply)
- Comprehend Web service Description Language and Universal Description and Discover Integration Concepts(Apply)
- Building Web services for any application(Apply)
- Apply methods for constructing and evaluating Web architectures(Apply)
- Identify the basics of Semantic Web(Apply)

TEXT BOOKS:

1. Ron Schmelzer et al, “XML and Web Services Unleashed”, Pearson Education, 2014.
2. Frank P.Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2010

REFERENCE BOOKS:

1. Russ Basiura and Mike Batongbacal, “Professional ASP .NET Web Services”, Apress, 2009
2. Henry Bequet and MeerajKunnumpurath, “Beginning Java Web, Apress, 2004

19UCS931	DISTRIBUTED SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

The student should be made to:

- Understand the concepts of communication in distributed environment.
- Understand the concepts of process and synchronization.
- Be familiar with the distributed resource management.
- Be aware of failure and fault tolerance and its security.
- Be familiar with the distributed system with various case studies.

UNIT I	COMMUNICATION IN DISTRIBUTED ENVIRONMENT	9

Introduction - Examples of Distributed Systems - Resource Sharing and Web - Challenges - API for Internet Protocol - External Data Representation and Marshaling - Remote Procedure Call - Communication Between Distributed Objects - Client Server Communication - Group Communication.

UNIT II	PROCESS AND SYNCHRONIZATION	9

Processes - Threads - Communication and Invocation - Clocks, Events and Process States - Synchronization Physical Clocks - Logical Time and Logical Clocks - Global States - Distributed Mutual Exclusion - Elections - Distributed Transactions.

UNIT III	DISTRIBUTED RESOURCE MANAGEMENT	9

Introduction - Data Centric Consistency Models - Client Centric Consistency Models - Distribution Protocols - Consistency Protocols - Casually Consistent Lazy Replication

UNIT IV	FAULT TOLERANCE AND SECURITY	9

Fault Tolerant Services - Atomic Commit Protocols - Concurrency Control in Distributed Transactions - Distributed Deadlocks - Transaction Recovery - Security Threads and Attacks - Access Control - Cryptography - Cryptography Algorithms - Kerberos - Electronic Payment System.

UNIT V	CASE STUDIES	9

Distributed Object Based System - CORBA - COM+ - Distributed File System - Sun NFS - Andrew File System - Distributed Coordination Based System - JINI.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Understand the various concepts of communication in distributed system. [Understand]
- Apply various knowledge of distributed system to solve problems relevant to process oriented activity. [Apply]

- Impart the knowledge of various synchronization techniques to synchronize multiple system in a distributed environment. [Apply]
- Solve problems related to resource management in a distributed system. [Apply]
- Apply the knowledge of device mechanism to provide ability to fault tolerate in distributed system. [Apply]
- Apply the engineering knowledge to solve security related problems in distributed system. [Apply]
- Analyze the applications of distribution systems in various fields. [Analyze]

TEXT BOOK:

1. George Colouris, Jean Dollimore and Tim Kinberg, “Distributed system concept and Design” Pearson Education, 4th Edition, 2012.

REFERENCE BOOKS:

1. A.S. Tanenbaum, “Distributed Operating Systems”, Pearson Education, 2011
2. Sunita Mahajan and Seema Shah, “Distributed Computing”, Oxford Higher Education, 2010.
3. A.S Tanenbaum and M. Van Steen, “Distributed Systems Principles and Paradigm”, Pearson Education, 2007
4. Ajay D. Kshemkalyani and Mukaesh singhal, “Distributed Computing Principles Algorithms & Systems”, Cambridge University press, 2010.
5. http://nptel.ac.in/syllabus/106106107/.

19UCS932	ROBOTICS AND APPLICATIONS	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

- Basic Engineering Mathematics
- Automation and Control

COURSE OBJECTIVES :

- To summarize the functions of the basic components of a Robot.
- To familiarize the various types of robot driven system and End of Effectors and Sensors
- To impart knowledge of Robot Kinematics and Programming
- To learn Robot safety issues and economics.
- To introduce the Robots for their control and design in Industries

UNIT I	INTRODUCTION TO ROBOTICS	7

Robotics: Robot Anatomy—Need for Robots-Types and components of a robot-Classification of robots,-closed-loop and openloop control systems.-Kinematics systems: Definition of mechanisms and manipulators-Social issues and safety– Applications of Robots.

UNIT II	ROBOT ACTUATION SYSTEM AND KINEMATICS	10

Actuators: Electric, Hydraulic and Pneumatic; Transmission: Gears, Timing Belts and Bearings, Parameters for selection of actuators-Robot Kinematics and Dynamics : Kinematic Modelling: Translation and Rotation Representation- Coordinate transformation-DH parameters, Jacobian, Singularity, and Statics- Dynamic Modelling: Equations of motion: Euler-Lagrange formulation

UNIT III	SENSORS AND VISION SYSTEM	9

Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc.-Introduction to Cameras-Camera calibration-Geometry of Image formation-Euclidean/Similarity/Affine/Projective transformations-Vision applications in robotics.

UNIT IV	ROBOT CONTROL	10

Basics of control: Transfer functions-Control laws: P, PD, PID-Non-linear and advanced controls.

UNIT V	CONTROL HARDWARE AND INTERFACING	9

Embedded systems: Architecture and integration with sensors-actuators-components-Programming for Robot Applications**,** Robot software – simulation software- Computer aided analysis of robots (using robo analyzer software) -Industrial Robot. **TOTAL:45 Periods**

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the basic engineering mechanisms to configure a Robot. [Apply]
- Identify the Kinematics and Dynamics for the design of Robotics. [Apply]
- Use Sensoric parameters and vision systems to estimate a robot system.[Apply]

- Design Control laws for a Robot systems.[Apply]
- Integrate hardware for real prototype of Robotic Device .[Apply]
- Select a Robotic System for real life applications.[Create]

Text Books

3. Saha, S.K., “Introduction to Robotics, 2nd Edition, McGraw-Hill Higher Education, New Delhi, 2014.
4. Mikell P. Grooveret. al., "Industrial Robots -Technology, Programming and Applications", McGraw Hill, New York, 2008 (Reprint).

REFERENCES BOOK:

3. John J.Craig , —Introduction to Robotics, Pearson, 3rd edition, 2009(Reprint).
4. R.K. Mittal, I.J. Nagrath, Robotics and control, Tata McGraw-Hill, 2003.
5. Ghosal, A., “Robotics”, Oxford, New Delhi, 2006.
6. Niku Saeed B., “Introduction to Robotics: Analysis, Systems, Applications”, PHI, New Delhi.
7. Mukherjee S., “Robotics and Automation”, Khanna Publishing House, Delhi.
8. Mark W. Spong, Seth Hutchinson, and M. Vidyasagar, “Robot Modelling and Control”, John Wiley and Sons Inc, 2005
9. Steve Heath, “Embedded System Design”, 2nd Edition, Newnes, Burlington, 2003
10. Merzouki R., Samantaray A.K., Phathak P.M. and Bouamama B. Ould, “Intelligent Mechatronic System: Modeling, Control and Diagnosis”, Springer.
11. Deb S. R. and Deb S., — Robotics Technology and Flexible Automation ,Tata McGraw Hill Education Pvt. Ltd, 2nd edition, 2010(Reprint).
12. http://nptel.ac.in/courses/112108093,http://www.roboanalyzer.com/tutorials.html

19UCS933	E-LEARNING CONCEPTS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- Understand the framework of E-Learning.
- Familiarize on developing Instructional system design.
- Be familiar with various assessment patterns available.
- Be aware of various tools available for assessment.

UNIT I	THE CONCEPTUAL FRAMEWORK	9

Introduction-Theoretical concepts-Text based communication-Community of inquiry-Social Presence-Cognitive presence-Teaching Presence.

UNIT II	INSTRUCTIONAL TECHNOLOGIES, BLENDED LEARNING AND GUIDELINES	9

E-learning Technologies, Web 2.0, Teaching and Technology, Blended learning, Learning Activities, Teaching-Learning Guidelines.

UNIT III	ASSESSMENT , EVALUATION AND ORGANIZATIONAL ISSUES	9

Assessing E-learning, Course Evaluation, Strategic Innovation, Infrastructure, Leadership.

UNIT IV	E-LEARNING DESIGN CONCEPTS AND CONSIDERATIONS	9

Role of the tutor, Instructional Design, Cognitive apprenticeships, Design Issues, Types of Learning Engagement.

UNIT V	TOOLS	9

E learning technologies-Usability-Learning objects and reusability-Digital rights and Copy rights – powerful tools for learning-Assistive technology issues and technology, Design for accessibility, Evaluation of assistive technologies.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Understand the concepts and framework of E-Learning. [Understand]
- Understand the various evaluation patterns available. [Understand]
- Apply various assessment methods for various topics. [Apply]
- Apply appropriate tools to evaluate the outcome. [Apply]
- Analyze various assessment patterns to predict the best suited. [Analyze]
- Develop an instructional system design to a course. [Create]

TEXT BOOKS:

1. D.Randy Garrison “E-Learning in the 21st century a framework for research and practice”, Second edition, Taylor and Francis, 2011.
2. John Gardner, Bryn Holems, “E-Learning : Concepts and practice” SAGE Publications, 2006.

REFERENCE BOOKS:

1. R.C.Clark and R.E.Mayer, “E-Learning and the science of instruction”, Pfeiffer Wiley, 2011.
2. Mark J Rosenberg, “E-Learning: strategies for delivering knowledge in the Digital Age”, McGraw- Hill, 2001.
3. Kjell E. (Erik) Rudestam , Judith Schoenholtz-Read, “Handbook of Online Learning”, Sage Publications Inc., Second Edition, 2009.

OPEN ELECTIVES OFFERED TO OTHER PROGRAMMES

Course Code	Course Title	L	T	P	C
19UCS971	Digital Marketing	3	0	0	3
19UCS972	Social Network Analysis Concepts	3	0	0	3
19UCS973	Java fundamentals	3	0	0	3
19UCS974	Cloud and Bigdata	3	0	0	3
19UCS975	Scripting Languages	3	0	0	3
19UCS976	Digital Automation with IOT	3	0	0	3
19UCS977	Programming and Data Structures	3	0	0	3
19UCS978	Introduction to CProgramming	3	0	0	3
19UCS979	Machine learning for Engineers	3	0	0	3

19UCS971	DIGITAL MARKETING	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To Provide an Overview of Digital Marketing plans.
- To Provide a Foundation of a Greater market share and Increasing brand awareness.

UNIT I	INTRODUCTION OF DIGITAL MARKETING	9

Introduction of Digital Marketing - Difference between Traditional Marketing and Digital Marketing, - Inbound and Outbound Marketing - Components of Online Marketing (Email, Forum, Social network, Banner, Blog) - Essentials of a website- Website designing

UNIT II	SEARCH ENGINE OPTIMIZATION	9

Introduction to Search Engines - Keyword Research and Competition - On page Optimization - Off page Optimization - Local SEO - Search Engine Algorithm Updates - SEO Reporting

UNIT III	GOOGLE ADWORDS	9

PPC Advertising (Online Advertisement) - Display Advertising - Google Shopping Ads -Introduction to Bing Ads -Mobile Marketing - Video Marketing - Google online Advertisement program

UNIT IV	SOCIAL MEDIA MARKETING	9

Introduction to SMM - Facebook Marketing - Facebook Advertising - Twitter Marketing & Ads -YouTube Marketing - LinkedIn Marketing - InstaGram Marketing - Email Marketing – Pinterest Marketing - Online Reputation Management - Web Analytics- Google Analytics - Audience Reports- Traffic Reports - Behavior Reports

UNIT V	EXPERIMENTAL TESTING	9

Conversion Tracking – Blogging & Google AdSense - Getting Started as Freelancer - Affiliate Marketing- Content marketing- Consumer Engagement – Tools & Resources -Legal and Ethical aspects related to Digital Marketing. Developing digital marketing strategy in Integration form

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the knowledge of Digital marketing to identify the components to achieve the latest digital marketing trends. [Apply]
- Apply the optimization techniques to plan, predict, and manage digital Marketing campaigns [Apply]
- Employ the techniques of Google adwords for marketing a company. [Apply]
- Apply the various marketing strategies to reach the more users through social media. [Apply]
- Analyze the digital marketing reports using various analytics methods. [Analyze]
- Apply various techniques to earn through digital marketing as a free lancer. [Apply]

TEXT BOOKS:

1. Puneet Singh Bhatia, Fundamentals of Digital Marketing First Edition, Publication Pearson.
2. Vandana Ahuja, Digital Marketing 1st Edition, Publication Oxford
3. Shivani Karwal, “Digital Marketing Handbook: A Guide to search Engine Optimization, Pay Per Click Marketing, Email Marketing and Content Marketing”, CreateSpace Independent Publishing Platform, 1st edition.

REFERENCE BOOKS:

1. Ian Dodson, The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted and Measurable Online Campaigns, Publication Wiley India Pvt Ltd.
2. Philip Kotler, Hermawan Kartajaya, Iwan Setiawan, Marketing 4.0: Moving from Traditional to Digital, Publication Wiley India Pvt Ltd.
3. Venakataramana Rolla, “Digital Marketing Practice guide for SMB: SEO, SEM and SMM”, CreateSpace Independent Publishing Platform, First edition.
4. Dave Chaffey, Fiona Ellis Chadwick, Digital Marketing: Strategy, Implementation & Practice, Paperback - Import, 2012.

19UCS972	SOCIAL NETWORK ANALYSIS CONCEPTS	L	T	P	C
		3	0	0	3

PRE-REQUISITE:Computer Networks

COURSE OBJECTIVES :

- To understand the components of the social network.
- Understand human behavior in social web and related communities
- Learn visualization of social networks.

UNIT I	INTRODUCTION	9

Overview: Social network data-Formal methods-Paths and Connectivity-Graphs to represent social relations-Working with network data-Network Datasets-Strong and weak ties -Closure, Structural Holes, and Social Capital-Web-based networks - Applications of Social Network Analysis.

UNIT II	MODELING AND VISUALIZATION	9

Visualizing Online Social Networks - A Taxonomy of Visualizations - Graph Representation - Centrality- Clustering - Node-Edge Diagrams - Visualizing Social Networks with Matrix- Based Representations- Node-Link Diagrams - Hybrid Representations - Modelling and aggregating social network data – Random Walks and their Applications –Use of Hadoop and Map Reduce - Ontological representation of social individuals and relationships.

UNIT III	MINING COMMUNITIES	9

Aggregating and reasoning with social network data, Advanced Representations – Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Evaluating Communities – Core Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Node Classification in Social Networks.

UNIT IV	PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES	9

Understanding and predicting human behaviour for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

UNIT V	SECURITY POLICIES	9

Security Policies : Access Control Policies: Authorization-Based Access ControlPolicies, Role-Based Access Control. Administration Policies, Identification andAuthentication, Auditing a Database System, Views for Security. Policy Enforcementand Related Issues: SQL Extensions for Security, Query Modification, DiscretionarySecurity and Database Functions, Data Privacy. Security Policies for Online SocialNetworks (OSN): Running Example, Access Control Policies, Filtering Policies, AdminPolicies. Security Policy Specification: Policy Language, Authorizations andProhibitions:

Access Control Authorizations, Prohibitions, Admin Authorizations.Security Rules, Security Rule Enforcement: General Approach, Admin RequestEvaluation, Access Request Evaluation.

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Outline the basic concepts of complex networksand random graphs.
- Visualize social networks.
- Apply Network Implications and cascades behaviour of social
- Predict human behavior in social web and related communities
- Identify the security methods to prevent the risks in socialmedia

TEXT BOOKS:

- Peter Mika, —Social Networks and the Semantic Web‖, Springer, 1st edition, 2007.
- BorkoFurht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.
- BhavaniThuraisingham, SatyenAbrol, Raymond Heatherly, MuratKantarcioglu, VaibhavKhadilkar and Latifur Khan,‖,Analyzing‖and‖Securing‖Social‖Networks',‖CRC‖Press‖- Taylor & Francis Group, 2016

REFERENCE BOOKS:

- GuandongXu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
- Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
- Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
- John G. Breslin, Alexandre Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

19UCS973	JAVA FUNDAMENTALS	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- For programming in the Java programming language,
- Obtain knowledge of object-oriented paradigm in the Java programming language,
- to use Java in a variety of technologies and on different platforms

UNIT I	INTRODUCTION TO JAVA	9

The Genesis of Java- Buzzwords- Object oriented Concept- Lexica Issues- Data types and variables- Arrays- Operators

UNIT II	OBJECT ORIENTED CONCEPTS	9

Control Statements Selection- Control Statement Iteration and jump Statement -Introducing classes- Class fundamentals- The General form of a class- Declaring Objects- Assigning object reference variables.

UNIT III	METHODS AND CLASSES	9

Introducing method – Constructors- The this Keyword- Garbage Collection- Finalize()method- Overloading methods- Overloading constructors- Using objects as parameters- Returning Objects- Recursion- Introducing access control- introducing final- Nested and Inner Classes- String class- command-Line arguments.

UNIT IV	INHERITANCE & EXCEPTION HANDLING	9

Inheritance Basics- using Super- method Overriding - abstract classes- Using final with Inheritance- Object class- Packages-Interfaces-Exception handling fundamentals- types- Using try, catch, throw, throws and finally exceptions.

UNIT V	MULTITHREADING, APPLET AND STRING HANDLING	9

Java thread model -creating thread-Thread priorities-synchronization-Inter-thread communication- Deadlock- Applet fundamentals- string constructors- string operations- character Extraction- string comparison- searching strings- modifying a string. **TOTAL: 45 Periods**

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- knowledge of the structure and model of the Java programming language, (Understand)

- use the Java programming language for various programming technologies (understand)
- develop software in the Java programming language, (apply)
- evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
- propose the use of certain technologies by implementing them in the Java programming language to solve the given problem(create)
- choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluate)

TEXT BOOKS:

1. Naughton and Schildt.H , "Java 2-The complete reference", Fifth Edition, McGraw Hill, (2007)

REFERENCES:

1. Subir Kumar Sarkar, T G Basavaraju and C Puttamadappa, —Ad Hoc Mobile Wireless Networksll, Auerbach Publications, 2008.

1. Arnold and Gosling.J, "The java programming language", Second edition,Addision Wesley,2000

2. Art Gittleman, "Ultimate Java Programming", First edition, Wiley Publications,2002

19UCS974	CLOUD AND BIG DATA	L	T	P	C
		3	0	0	3

PRE-REQUISITE: COMPUTER NETWORKS, DATABASE CONCEPTS

COURSE OBJECTIVES :

- To study the fundamentals of cloud computing
- To understand the security issues in cloud computing
- To study the fundamentals of Big Data and Hadoop architecture
- To learn about how the cloud computing can be used for Big Data

UNIT I	CLOUD COMPUTING FUNDAMENTALS	9

Cloud computing components- Deployment models of Cloud- Services offered by Cloud- Benefits and Limitations of Cloud Computing – Issues in Cloud security- Cloud security services and design principles - Virtualization –Types of Virtualization- Server Virtualization- Desktop Virtualization – Memory Virtualization – Application and Storage Virtualization- Tools and Products available for Virtualization

UNIT II	SECURITY ISSUES IN CLOUD COMPUTING	9

Security concerns in Traditional IT, Challenges in Cloud Computing in terms of Application Security, Server Security, and Network Security. Security reference model, Abuse and Nefarious Use of Cloud Computing, Insecure Interfaces and APIs, Malicious Insiders, Shared Technology Issues, Data Loss or Leakage, Account or Service Hijacking, Unknown Risk Profile, Different vendors offering Cloud Security for public and private clouds.

UNIT III	INTRODUCTION TO BIG DATA	9

Introduction to Big Data – Characteristics of Data – Evolution of Big Data – Big Data Analytics – Classification of Analytics – Top Challenges Facing Big Data – Importance of Big Data Analytics – Data Analytics Tools.

UNIT IV	DATA ANALYTICAL FRAMEWORKS	9

Introducing Hadoop –Hadoop Overview – RDBMS versus Hadoop – HDFS (Hadoop Distributed File System): Components and Block Replication – Processing Data with Hadoop – Introduction to MapReduce – Features of MapReduce – Introduction to NoSQL: CAP theorem – MongoDB: RDBMS Vs MongoDB – Mongo DB Database Model – Data Types and Sharding.

UNIT V	BIGDATA IN THE CLOUD	9

Big data Vs Cloud Computing - Need of Cloud for Big data- Opportunities and Challenges of Big data in the cloud- Cloud Computing role for Big data – Benefits of Big data analysis in Cloud – Cloud computing technologies used for Big data

TOTAL: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Identify and use the proper deployment models to offer the cloud services. [Apply]
- Choose the proper virtualization types to deliver the cloud services. [Apply]
- Identify and apply the proper security measures for securing the cloud environment. [Apply]
- Design solution for real time problems using the big data analytic tools and techniques.[Create]
- Develop a solutions for real time data analytics problem using Hadoop mechanism.[Create]
- Employ the cloud computing technologies for the big data processing. [Apply]

TEXT BOOKS:

1. Anthony T .Velte, Toby J.Velte, Robert Elsenpeter, “Cloud Computing: A Practical Approach”, Tata McGraw Hill Edition, Fourth Reprint, 2010

2. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill, 2012.

REFERENCE BOOKS:

1. Ronald L.Krutz, Russell vines, “Cloud Security: A Comprehensive Guide to Secure Cloud Computing”, Wiley Publishing Inc., 2010.

2. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.

3. Vignesh Prajapati, “Big Data Analytics with R and Haoop”, Packet Publishing 2013.

4. Kris Jamsa, “Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and more”, Jones & Bartlett Learning Company LLC, 2013.

19UCS975	SCRIPTING LANGUAGES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To make them understand the concepts of scripting languages for developing web based projects.
- To facilitate them to create database connections using PHP and build the website for the world.
- To improve their ability to demonstrate IP address for connecting the web servers.
- To provide knowledge to analyze the internet ware application, security issues and frame works for application.

UNIT I	INTRODUCTION TO SCRIPTING	9

Inter networking: The Internet-Basic Internet protocols-World Wide Web-HTTP-Web clients-Web Servers-Working with TCP/IP - IP address –URL - WWW –HTTP Scripting: Scripts and Programs, Characteristics of Scripting Languages, Uses for Scripting Languages. Web scripting, Java, The universe of scripting Languages-Values, Types and Operators- Values-Numbers-Strings-Unary Operators-Boolean Values-Empty Values-Automatic type Conversion

UNIT II	JAVA SCRIPT	9

Program Structure Expression and statements-Bindings-Functions-Conditional Execution While and do loops For Loops-Switch—Arrays-Functions

UNIT III	ADVANCED JAVASCRIPT	9

Data Structures: Objects and arrays-The secret life of Objects-Modules Java Script and the Browser-Handling Events-HTTP and Forms

UNIT IV	PHP BASICS	9

PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions

UNIT V	ADVANCED PHP PROGRAMMING	9

Advanced PHP Programming**:** PHP and Web Forms, Files, Uploading Files with PHP, Sending

Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World.

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Develop programs for simple data processing in Java script (Apply)
- Solve the problems handling complex data types using Java script (Apply)
- : Formulate Internet aware applications using Java Scripts (Create)
- Write programs using selection and conditional statements of PHP.(Apply)
- Compute solutions for the complex problems using arrays strings and functions in PHP(Apply)
- Create web forms using advanced PHP Concepts(Create)

TEXT BOOKS:

1. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Prentice Hall, 2007
2. The World of Scripting Languages, David Barron, Wiley Publications.
3. VBScript- Programmer's Reference Susanne Clark, Antonio De Donatis, Adrian Kingsley−Hughes et al, Wiley Publishing, Inc.
4. Beginning PHP and MySQL, 3rd Edition, Jason Gilmore, Apress Publications (Dream tech.)

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee
and B.Ware(Addison Wesley) Pearson Education.
2. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
3. PHP 5.1, I.Bayross and S.Shah, The X Team, SPD. Pearson Education.
4. PHP and MySQL by Example, E.Quigley, Prentice Hall (Pearson).
5. PHP Programming solutions, V.Vaswani, TMH.

19UCS976	DIGITAL AUTOMATION WITH IOT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To understand the concepts of Internet of Things.
- To identify the various elements of an IoT System.
- To understand the various means of communication from Node / Gateway to Cloud Platforms.
- To identify types of data analytics and data visualization tools.
- To make students aware of security concerns and challenges while implementing IoT solutions.

UNIT I	INTRODUCTION TO IOT	9

Introduction to IoT, Current technological trends and future prospects, - Evolution of IoT , Business Scope, Relation with embedded system, - Basic Architecture of an IoT, From M2M to IoT, M2M towards IoT, IoT Value Chains, An emerging industrial structure for IoT.

UNIT II	ELEMENTS OF IOT	9

Application Sensors & Actuators - Edge Networking (WSN) – Gateways - IoT Communication Model – WPAN and LPWA, Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards, Wearable Development Boards.

UNIT III	COMMUNICATION AND CONNECTIVE TECHNOLOGIES	9

IoT Communication Model, Cloud computing in IoT, IoT in cloud architecture, Logging on to cloud, Selecting and Creating cloud service, cloud based IoT platforms - IBM Watson, Google cloud.

UNIT IV	DATA ANALYTICS AND IOT PLATFORM	9

Big Data Analytics , Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Apache Storm, Data Visualization, Visualization tools for IoT.

UNIT V	DIGITAL AUTOMATION BASED HANDS-ON PROJECTS	9

Industry 4.0 concepts. Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi / Intel Galileo/ARM Cortex/ Arduino), DIY Kits – Soil moisture monitoring, Weather monitoring, Air quality Monitoring, Movement Detection.

TOTAL : 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Learn and understand the technology and current trends in Internet of things.[Understand]
- Understand the various elements of IoT system and hardware devices.[Understand]
- Develop IoT Applications based on the cloud computing and its relevance. [Apply] Design and implement IoT applications that manages big data with data analytics. [Apply]
- Implement IoT solutions based on the aware of security concerns and challenges.[Apply]
- Develop hands-on projects using an appropriate software and hardware devices in various digital automation applications.[Analyze]

TEXT / REFERENCE BOOKS

1. The Internet of Things: Applications and Protocols, Wiley publications. Author(s): Oliver Hersent, David Boswarthick, Omar Elloumi.

2. Architecting the Internet of Things, Springer publications. Author(s):Dieter Uckelmann, Mark Harrison, Florian Michahelles.

3. Internet of Things with Arduino Cookbook, Packt Publications. Author(s): Marco Schwatrz. 4. Internet of Things and Data Analytics, Wiley Publications.

19UCS977	PROGRAMMING AND DATA STRUCTURES	L	T	P	C
		3	0	0	3

PRE-REQUISITE: COMPUTER PROGRAMMING

COURSE OBJECTIVES :

- To impart knowledge on linear and non-linear data structures.
- To familiarize various algorithm design and analysis techniques
- Be exposed to sorting, searching, hashing algorithms

UNIT I	LINEAR DATA STRUCUTRE – ARRAYS, LIST	9

Abstract Data Type – Approaches to design an Algorithm – Complexity – Arrays: Accessing Elements – Operations – List ADT: Memory Allocation and De-allocation – Singly linked lists – Circular linked lists – Doubly linked lists – Applications of lists – Polynomial Manipulation

UNIT II	LINEAR DATA STRUCTURES – STACKS, QUEUES	9

Stack ADT – Evaluating arithmetic expressions- other applications- Queue ADT – circular queue implementation – Double ended Queues – applications of queues

UNIT III	NON-LINEAR DATA STRUCUTRE – TREE	9

Introduction – Basic Terminology – Traversal – Operations: Binary trees – Expression Tree – Binary Search trees – AVL trees– B-trees. Heap: Binary Heaps – Applications of Heap

UNIT IV	NON-LINEAR DATA STRUCTURE – GRAPH	9

Introduction – Graph Terminology – Representation of Graphs – Graph Traversal – Topological sort – Minimum Spanning Trees – Prim‟s and Kruskal‟s Algorithm – Shortest path algorithm – Dijkstra‟s algorithm – Floyd‟s Algorithm – Warshall‟s algorithm.

UNIT V	SORTING, SEARCHING AND HASH TECHNIQUES	9

Searching: Linear Search – Binary Search, Sorting: Selection Sort – Bubble Sort – Insertion Sort – Merge sort – Quick sort – Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL:45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Understand the various applications like linear and non-linear data structures to solve the problems in relevant applications [Understand]
- Apply the concept of linear data structures like stacks, queues and linked lists to access and organize the data [Apply]
- Employ operations on different types of trees and their applications in solving problems. [Apply]
- Design solutions using nonlinear data structures such as AVL trees to solve real world problems efficiently [Apply]
- Design and implement an appropriate hashing function for the applications [Apply]
- Analyze the different Program to implementations of various data structure algorithms and to calculate the efficiency of algorithms.[Analysis]

TEXT BOOKS:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education,2009.
2. ISRD Group, “Data Structures using C”, 2nd Edition, McGrraw-Hill Education (India) Private Limited, 2013.

REFERENCE BOOKS:

1. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, 1983.
2. R. F. Gilberg, B. A. Forouzan, “Data Structures: A Pseudocode approach with C”, Second Edition, Thomson India Edition, 2005.
3. Sara Baase and A. Van Gelder, “Computer Algorithms”, Third Edition, Pearson Education, 2000.
4. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", Second Edition, Mcgraw Hill, 2002.
5. Reema Thareja, “Data Structures Using C”, Oxford University Press, 2011

19UCS978	INTRODUCTION TO C PROGRAMMING	L	T	P	C
		3	0	0	3

PRE-REQUISITE:

COURSE OBJECTIVES :

- To familiarize the programming constructs of C
- To explain the concepts of arrays, functions, pointers, structures in C
- To explain the concepts of file

UNIT I	COMPUTER FUNDAMENTALS	9

Introduction – Characteristics of Computers – Evolution of Computers – Computer Generations – Classification of Computers – Basic Computer organization – Number Systems – Problem Analysis – Algorithms – Flow charts – Computer Software – Types of Software.

UNIT II	BASIC C PROGRAMMING	9

Overview of C Program – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operations – Decision Making and Branching – Decision making and Looping.

UNIT III	ARRAYS AND FUNCTIONS	9

Arrays: One dimensional arrays – Two dimensional arrays – Multi dimensional arrays. Character arrays and Strings: Declaring and initializing String Variables – Comparison of two strings – String handling functions. User defined Functions: Definition – Declaration – Function calls – Category of Functions – Recursion - Storage Classes

UNIT IV	STRUCTURES AND POINTERS	9

Structures and Unions: Definition – Declaration – Accessing structures – Initialization of structures – Arrays of structures – Arrays within Structure – Structures within Structures - Structures and functions - Unions. Pointers: Initialization – Pointers and arrays- Array of pointers – Pointers as function arguments – Pointers to functions – Pointers and Structure.

UNIT V	FILES AND DYNAMIC MEMORY ALLOCATION	9

File management in C – Defining and opening a file – closing a file - Input and Output operations on file – Error handling during IO operations – Random access to files – Command line Arguments. Dynamic memory allocation: Allocating a block of memory - Allocating a multiple block of memory –

Releasing the used space Altering the size of a block.

TOTAL:45Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Recognize the system fundamentals and the role of hardware components of the Computer. (Understand)
- Apply the basic concepts to solve simple problems by applying the logics of conditional statements and looping constructs. (Apply)
- Handle similar types of data using array and understand their functionality. (Understand)
- Apply the call by value and call by reference features in functions. (Apply)
- Design programs involving their own derived data types, pointers, memory allocation concepts. (Create)
- Handle the file contents with access permissions. (understand)

TEXT BOOKS:

1. Ashok.N.Kamthane, —Computer Programming‖, Pearson Education, India,2008.

2. E. Balagurusamy, —Programming in ANSI C‖, 6 th Edition Multicolor, 2013.

REFERENCE BOOKS:

1. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C‖, 1 st Edition, Oxford University Press, 2009

2. Stephen G.Kochan, —Programming in C‖, 3 rd Edition, Pearson Education, India, 2005.

3. Brian W.Kernighan and Dennis M.Ritchie, —The C Programming Language‖, Pearson Education Inc., 2005

19UCS979	MACHINE LEARNING FOR ENGINEERS	L	T	P	C
		3	0	0	3

PRE –REQUISITE:

COURSE OBJECTIVES :

- To impart basic concepts and techniques in Machine Learning.
- To familiarize the concepts of Supervised and Unsupervised learning techniques
- To study probabilistic model based learning
- To introduce neural networks and Deep Learning

UNIT I	INTRODUCTION TO MACHINE LEARNING	9

Types of machine learning: Supervised learning- Unsupervised learning-Reinforcement Learning-Machine Learning Process-Terminologies: Weight Space, Curse of Dimensionality, Over fitting, Training, Testing, Validation Sets Performance Measures: Confusion Matrix, Accuracy Metrics, Receiver Operator Characteristic (ROC) Curve, Measurement Precision- Model selection-No free lunch theorem- Bias-Variance Tradeoff

UNIT II	SUPERVISED LEARNING REGRESSION	9

Supervised Learning- Regression-Linear regression- Gradient Descent Algorithm – Stochastic Gradient Descent Algorithm- Multivariate Regression- Logistic Regression-Linear Discriminant Analysis-Regularization- Principal Component Regression

UNIT III	SUPERVISED LEARNING CLASSIFICATION	9

Basics of supervised learning -Classification model - Probability and Bayes learning - Naive Bayes - Bayesian Network - K-nearest neighbor- Decision tree-Random Forest-Support Vector Machine.

UNIT IV	NEURAL NETWORK	9

Basics of Neural Network-Understanding the biological neuron and artificial neuron-Types of activation functions- Early implementations of ANN -McCulloch Pitt's , Rosenblatt's Perceptron, ADALINE – Architectures of neural network- Learning process in ANN- Back propagation -Deep learning

UNIT V	UNSUPERVISED LEARNING	9

Clustering-Applications-Similarity measures-Partition based clustering techniques- K means clustering, k-mediod clustering- Hierarchical clustering-Density based clustering-Cluster validation
TOTAL: 45 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Understand the concepts of machine learning for solving various complex problems of engineering. (Understand)
- Apply the knowledge of machine learning to solve complex engineering problems based on regression, classification and Clustering. (Apply)
- Identify the suitable Machine learning algorithm for complex engineering problems for reaching sustained conclusions using the principles of mathematics. (Analyze)
- Design solutions for complex engineering problems to predict or forecast the results for engineering, business, health care and environmental applications.(Apply)
- Interpret the data and synthesize the information using Machine Learning algorithms and statistical methods to provide valid conclusions.(Evaluate)
- Design a model for a given problem using modern tools for predicting the results of the complex engineering problems, considering the limitations of the model.(Create)

TEXT BOOKS:

1. SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, Machine Learning,Pearson,2019.
2. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.
3. Stephen Marsland, “Machine Learning - An Algorithmic Perspective” 2nd Edition, CRC Press, 2015 2.

REFERENCE BOOKS:

1. Hastie, Trevor, Tibshirani, Robert, Friedman, Jerome, The Elements of Statistical Learning. Data Mining, Inference, and Prediction, Second Edition,February 2009, Springer.
2. Christopher M. Bishop,Pattern Recognition and Machine Learning, Springer.
3. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.
4. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals, First Edition, Wiley, 2014
5. EthemAlpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014

LIST OF ONE CREDIT COURSES

LIST OF ONE CREDIT COURSES

Course Code	Course Title	L	T	P	C
19UCS861	R Programming	0	0	2	1
19UCS862	Server Side Scripting	1	0	0	1
19UCS863	Client side Scripting	1	0	0	1
19UCS864	Ruby on Rails	1	0	0	1
19UCS865	Wordpress	1	0	0	1
19UCS866	Multimedia	1	0	0	1
19UCS867	Mongo DB	0	0	2	1
19UCS868	Software Testing Tools	1	0	0	1
19UCS869	Animation Graphics	0	0	2	1
19UCS870	UML Modeling	0	0	2	1
19UCS871	Game Development	0	0	2	1
19UCS872	Comprehension-1(Data Strutures and Algorithms-INFYTQ)	0	0	2	1
19UCS873	Comprehension-2 (DBMS-INFYTQ)	0	0	2	1

19UCS861	R PROGRAMMING	L	T	P	C
		0	0	2	1

PRE-REQUISITE : C, C++, Java

COURSE OBJECTIVES:

- To Provide the Procedures for R installation and develop R Programs for Data Exploration.

LIST OF EXPERIMENTS

1. Installing R and its Packages in R.
2. Programs on Data types in R
3. Built-in Functions in R
4. Creating and manipulating a vector in R
5. Creating matrix and Manipulating matrix in R
6. Creating and Operations on Factors in R
7. Operations on Data frames in R
8. Programs on control structures in R
9. Programs on loops in R
10. Customizing Graphs in R

TOTAL : 15 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Install R Packages. (Apply)
- Write Simple Programming in R(Apply)
- Use R for descriptive statistics (Apply)
- Use R to visualize the data.(Apply)

HARDWARE AND SOFTWARE REQUIRMENTS

HARDWARE REQUIREWMENTS:

Personal Computers – 30 Numbers

SOFTWARE REQUIREMENTS:

RStudio

19UCS862	SERVER SIDE SCRIPTING	L	T	P	C
		1	0	0	1

PRE-REQUISITE: WEB PROGRAMMING

COURSE OBJECTIVES :

- The general objectives of this course are to provide fundamental concepts of server side script programming using JavaScript and PHP respectively along with database connectivity.
- Learn the basics of the PHP programming language and how to write programs using PHP.
- Learn the basics of Java Servlets and JSP for implementing web applications written in Java.

UNIT I	INTRODUCTION TO PHP	5

PHP introduction ,Introduction to Server Side Scripting Language, Basic PHP Syntax, Comments in PHP, Variables, PHP Operators, Control Structures(If else, switch, all loops), PHP include File, File Handling, File Uploading, PHP Sessions, Sending Emails, PHP Cookies

UNIT II	MYSQL CONCEPTS	5

Introduction to MySQL, PHP MySQL Connect to a Database, Closing a Connection, MySQL Data Types, MySQL Insert, MySQL Select, MySQL Where Clause, MySQL Delete, MySQL Update, MySQL Aggregate Functions(sum, avg, count etc); MySQL Order by and Group by Clause, MySQL Sub queries, MySQL Joins

UNIT III	XML	5

Introduction to XML, Anatomy of an XML, document, Creating XML Documents, Creating XML DTDs, XML Schemas, XSL

TOTAL: 15Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Develop the modern Web applications using server side technologies and the web design fundamentals. [Apply]
- Develop SQL commands and use a database to develop data-driven Web applications.[Apply]
- Design XML Schema and corresponding XML document.[Apply]

TEXT BOOK:

1. Web Technologies, Uttam K Roy, Oxford University Press.
2. PHP : The Complete Reference By Steven Holzner, Tata McGrawHill.

REFERENCE BOOKS:

1. Developing Web Applications in PHP and AJAX, Harwani, McGrawHill.
2. Jeffrey C Jackson, Web Technologies A Computer Science Perspective, Pearson Education Inc. 2009..
3. Chris Bates, Web Programming Building Internet Applications, 3/e, Wiley India Edition 2009.

19UCS863	CLIENT SIDE SCRIPTING	L	T	P	C
		1	0	0	1

PRE-REQUISITE:

COURSE OBJECTIVES :

- To learn the fundamentals of HTML.
- To add the dynamic content to pages using JavaScript that meet specific needs and interests.
- To facilitate the student to design interactive webpage using scripting language.

UNIT I	MARKUP LANGUAGES	5

An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics-Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms-HTML 5.0

UNIT II	CLIENT-SIDE SCRITING (CSS)	4

Basics of CSS, CSS properties for manipulating texts, background, colors, Gradients, Shadow Effects, borders, margins, paddings, transformations, transitions and animations.

UNIT III	JAVASCRIPT AND JQUERY	6

JavaScript: History and Versions Introduction JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays-Built-inObjects-JavaScript Debuggers.

jQuery: Basics, syntaxes, selectors, events, effects

TOTAL:15Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Design simple web pages using HTML. (Create)
- Add dynamic content to the page by Java Script to meet the specific needs. (Create)
- Create a dynamic webpage using Java Scriptlibraries jQuery. (Create)

TEXT BOOKS:

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.

REFERENCE BOOKS:

1. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson Education, 2006.
2. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.
3. Harvey M Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.
4. Marty Hall and Larry Brown,‖ Core Web Programming‖ Second Edition, Volume I and II, Pearson Education, 2001.

19UCS864	RUBY ON RAILS	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES :

- Develop programming skills and logical ability with the use of Ruby Programming language platform.
- Understanding web application development using Rails framework.

UNIT I	RUBY INSTALLATION AND BASICS	5

Introduction–Install RVM(Ruby Version Manager) - Ruby basics-IRB - Variables -Ruby Operators -Control Structures- Iterators - Arrays-Hashes

UNIT II	RUBY OOPS	5

Ruby Class - Inheritance - Ways of Creating Ruby object - Ruby Methods - String Class**-**File Class-Exceptions.

UNIT III	RAILS BASICS	5

Rails Installation and Ruby Gems-Databases - RAILS MVC - Model - Views– Controller-Building Hello World Rails Application Step by Step.

TOTAL : 15 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Deploy ruby version manager.
- Implements ruby object oriented concepts and exceptions.
- Demonstrate web application development using Rails framework.

REFERENCES:

1. Yukihiro Matsumoto (2008), The Ruby Programming Language, Shroff; First edition, 2008, ISBN-10: 8184044925, ISBN-13: 978-81840449282.
2. Michael Fitzgerald, Learning Ruby, Published by O'Reilly Media, Inc.,May 2007, ISBN-10: 8184043341, ISBN-13: 978-81840433413.
3. Rails AntiPatterns, Wesley Professional Ruby Series, 1st edition, 2010, ISBN-10: 0321604814, ISBN-13: 978-03216048114.
4. Adam Gamble, Cloves Carneiro, Jr. Rida Al Barazi (2007), Beginning Rails4, Apress, 3rd edition, 2013ISBN-13 (pbk): 978-1-4302-6034-9| ISBN-13 (electronic): 978-1-4302-6035-6

19UCS865	WORD PRESS	L	T	P	C
		1	0	0	1

PRE-REQUISITE:

COURSE OBJECTIVES :

- To learn the fundamentals in wordpress.
- To become familiar to design a content in webpage.
- Interacting with your reader, through customizing the look.

UNIT I	GETTING FAMILIAR WITH WORDPRESS	5

Setting Up WordPress- Setting Up database-Installing WordPress-How WordPress Works-Finding way to dashboard-Exporting and importing site condent-To back up your data-Upgrading WordPress. Setting: general settings-writing settings-reading settings-discussion settings- media settings-plugin settings. Managing accounts: Configuring Your Account-Managing user accounts.

UNIT II	ADDING CONTENT & WORKING WITH MEDIA,COMMENTS	5

Adding posts- Adding page-Editing post and pages- Setting Up and Using Categories- Using Tags-Internal Linking- Working with Media: Using the Media Library- Uploading audio files-Uploading video files.

UNIT III	CUSTOMIZING WORDPRESS THEME	5

Widgets and Plug-ins WordPress Default Theme- Choosing a New Theme- the Theme Editor-Setting menu-Post format- Getting Fancy With Themes: Customizing Theme with CSS- Adding favicon- Editing the Functions File.

TOTAL:15 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Install and configure Word Press on a hosting account.(Apply)
- To design a web page with content and media.(Create)
- The ability to configure Word Press new themes and plugins into your WordPress site.(Apply)

TEXT BOOK:

1.WordPress Visual QuickStart Guide (2nd Edition) by Matt Beck, Jessica Neuman Beck (z lib.org)

REFERENCE BOOK:

1.WordPress Absolute Beginner's Guide ,Tris Hussey March 2014

19UCS866	MULTIMEDIA	L	T	P	C
		1	0	0	1

PRE-REQUISITE:

COURSE OBJECTIVES :

-

UNIT I	INTRODUCTION TO MULTIMEDIA	5

Evolution of Multimedia – Structure and components of Multimedia – multimedia platforms- Applications of Multimedia in Education, Communication, Medication, Business, Entertainment – Video Conferencing, Web Streaming, Video Streaming, Internet Telephony – Virtual Reality

UNIT II	2D & 3D ANIMATION	5

Animation – compositing – rendering and editing – cell & computer animation – model building – key frame animation – dynamic particles – character animation – modeling and animation techniques.

UNIT III	AUDIO AND VIDEO FORMATS	5

Video basics - Working with video - Video Formats - Video hardware - encoding – decoding – video editing – non-linear editing – Audio basics – working with audio – audio formats – audio hardware & software. Adobe Premiere – tools & features – recording audio & video – types of audio & video – time line – project planning – trimming – motion effects – digital composting

TOTAL:15 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply appropriate design Techniques in various fields (Apply)
- Design creative ideas relevant for print medium.(Apply)
- Solve human-centric problems using multimedia.(Create)
- Use appropriate formats for storage(Create)

TEXT BOOKS:

1. The Ultimate Multimedia Handbook, Tata Mc Graw Hill
2. Multimedia at Work, Tata Mc Graw Hill
3. Adobe Photoshop Unleashed, Tata Mc Graw Hill

REFERENCES BOOKS:

1. Teach yourself Corel Draw, Sams Publishing
2. Flash Mx for Dummies, Pustak Mahal

19UCS867	MONGODB	L	T	P	C
		1	0	0	1

COURSEOBJECTIVES:

- To introduce the concepts of NoSQL, MongoDB and Data model.
- To familiarize the students with CRUD , Indexing and Aggregation operations.
- To introduce the Replication , Sharding, Backup and Recovery concepts in MongoDB

UNITI	INTRODUCTION AND SCHEMA DESIGN	5

NoSQL Databases: Advantages –New SQL –Comparison of SQL, NoSQL and NewSQL – MongoDB: Overview –Collection, Documents, Key/values – JSON and BSON documents- Setting up the environment-MongoDB Data Model – Model examples and Patterns –Model relationships between documents – Model tree structures- Model specific application contexts

UNITII	CRUD OPERATIONS , INDEXING AND AGGREGATION	5

Introduction – CRUD concepts – Concerns- concern Levels and Journaling – Cursor Query optimizations –MongoDB data types. Index: Introduction – Concepts, Types, Properties, Creation and Reference. Aggregation: Introduction – Approach to aggregation, Types.

UNITIII	SCALABILITY , AVAILABLITY AND ADMINISTRATION	5

Introduction to Replication – Concepts – Types- Setup. Introduction to Sharding – Concepts – Types – Setup. Security –Introduction – concepts – Intergration of MongoDB with Java. Administration concepts in MongoDB –Monitoring – Backup and Recovery- Export and Import of data

TOTAL:15Periods

COURSEOUTCOMES:

Afterthesuccessfulcompletionofthis course,thestudentwillbeableto

- Store unstructured data in MongoDB and develop skills for processing huge amounts of data using MongoDB tools. (Apply)
- Apply the knowledge of creating and managing different types of indexes in MongoDB for query execution. (Apply)
- Use the skills of replication and sharding of data in MongoDB to optimize read/write performance and perform installation, configuration, and maintenance of the MongoDB environment. (Apply)
- Demonstrate MongoDB configuration, backup methods, monitoring, and operational strategies. (Apply)

TEXT BOOKS:

1. AmolNayak, “MongoDB Cookbook Paperback”, Packt Publishing Limited,November 2014.
2. Kristina Chodorow, “MongoDB: The Definitive Guide: Powerful and Scalable Data Storage”, O’Reilly, 2nd edition, May 2013.

WEB REFERENCES:

1. https://beginnersbook.com/2017/09/mongodb-tutorial/
2. https://www.mongodb.com/
3. http://www.w3resource.com/mongodb/nosql.php

19UCS868	SOFTWARE TESTING TOOLS	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To familiarize the students with the methodologies & usage of Tools
- To summarize competency in the logic like Testing Terminology.

UNIT I	INTRODUCTION	5

Purpose of Testing-Types of Testing-Model for testing-consequences of bugs-taxonomy of bugs-Usage of Modern Testing Tools

UNIT II	INTRODUCTION TO TESTING TOOL:JMETER	5

JMeter overview-JDBC Test Terminolgy:Creating the Thread group, creating the JDBC Request, Adding the Listeners that display the result, Saving the test Plan, Running the Test Plan, Insert the timer.

UNIT III	JMETER:HTTP TEST AND ADVANCED TESTING TOOLS	5

Http Test Overview-Creating the Thread group, Creating the HTTP Request, Adding the Listeners that display the result, Saving the test Plan, Running the Test Plan, Insert the timer-Viewing a Result in a Tabular Format. (Exposure to tools like Test Director)

TestRail: Testing Methods, Tools objectives, TestRail core and Management Features.

TOTAL: 15 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the knowledge of testing and taxonomy of bugs.[Apply]
- Explain the process involved in testing Tool & Test Terminology. [Apply]
- Illustrate the logic based on testing Tools. [Analyze]

TEXT BOOKS

1. Software Testing Techniques, Boris Beizer, Dreamtech, Second Edition.
2. Software Testing Tools ,Dr. K.V.K.K.Prasad, Dreamtech. - Covering WinRunner, Silk Test, LoadRunner, JMeter and TestDirector with case studies

REFERENCE BOOKS

1. The craft of software testing- Brain Marick, Pearson Education.
2. Introduction to Software Testing: P. Ammam & J.Offutt. Cambridge Univ. Press.
3. Software Testing M.G.Limaye TMH
4. Foundations of Software Testing, D. Grahm & Others, Cengage Learning.
5.http://nancyhoekstrxa.blogspot.com/2018/11/download-software-testing-tools.html

19UCS870	UML MODELING	L	T	P	C
		0	0	2	1

PRE-REQUISITE :

COURSE OBJECTIVES:

- To demonstrate the process of object-oriented analysis and design to software development using CASEtools.

LIST OF EXPERIMENTS

Develop a mini project based on thefollowing

1. To develop a problemstatement.
2. Identify Use Cases and develop the Use Casemodel.
3. Identify the conceptual classes and develop a domain model with UML Class diagram.
4. Using the identified scenarios, find the interaction between objects and represent them usingUML Sequencediagrams.
5. Draw relevant state charts and activitydiagrams.
6. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered,logical architecture diagram with UML package diagramnotation.
7. Develop and test the Technical serviceslayer.
8. Develop and test the Domain objectslayer.
9. Develop and test the User interfacelayer.

SUGGESTED LIST OF MINI PROJECTS

1. Passport automationsystem.
2. BankingSystem
3. Library ManagementSystem
4. Online course reservationsystem
5. E-ticketing
6. Student InformationSystem
7. Conference ManagementSystem
8. RecruitmentSystem
9. Stock maintenance system.
10. Exam registration

TOTAL : 30 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Design the projects using OOconcepts. (Apply)
- Use the UML graphical notations for the appropriatediagrams.(Create)
- Use the UML analysis and design models.(Create)
- Apply appropriate design patterns(Apply)
- Convert design into code. (Create)
- Implement the modified system and test it for various scenarios. (Apply)

HARDWARE AND SOFTWARE REQUIRMENTS

HARDWARE REQUIREWMENTS:

Personal Computers – 30 Numbers

SOFTWARE REQUIREMENTS:

A working computer system with either Windows or Linux Rational Rose Software or Visual Paradigm Software

19UCS871	GAME DEVELOPMENT	L	T	P	C
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COURSE OBJECTIVES :

- Understand the basic concepts of game theory.
- Be familiar with the repeated games.
- Be familiar with the bayesian games.

UNIT I	INTRODUCTION TO GAME THEORY	5

Introduction to game theory, routing games and mechanisms design, strategies, costs and payoffs, Prisoners dilemma, Nash equilibrium, strategic game.

UNIT II	REPEATED GAMES	5

Repeated game with observable actions, Finitely repeated games, repeated games it varying opponents, pareto perfection and renegotiation-proofness in repeated games.

UNIT III	BAYESIAN GAMES	5

Incomplete information, example, notation of type and strategy, deletion of strictly dominated strategies.

TOTAL : 15 Periods

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply the knowledge of Device a mechanism to estimate the cost of a game to solve a complex engineering problem [Apply]
- Identify the possibility of completing a repeated game in finite number of times. [Analyze]
- Review the strategy of Bayesian games. [Analyze]

TEXTBOOKS:

1. Game Theory by D.Fudenber and J.Tirole, MIT Press.
2. Algorithmic game theory, edited by N.Nisan, T.Rough Garden, E.Tardos, V.V.Vazirani, Cambride university press, 2007

REFERENCE BOOKS:

1. Action theory by V.Krishna, Academic press, 2002
2. A course in game theory by M.J.Osborne, A.Rubeinstein, MIT press.
3. Dynamic non cooperative game theory, by T.Basker and G.J.Oslder.
4. Evolutionary game theory by Jorgen W.Weibull, The MIT press.