SETHU INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

B.TECH INFORMATION TECHNOLOGY

REGULATIONS 2019

Estd : 1995

REVISED CURRICULUM AND SYLLABUS
(1st SEMESTER TO 8th SEMESTER)

(FOR THOSE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2019-2020 ONWARDS)

CHAIRMAN
Board of Studies
Information and Technology
Sethu Institute of Technology
Pulloor, Kariapatti- 625 115

CHAIRMAN

ACADEMIC COUNCIL
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Sethu Institute of Technology
Pulloor, Kariapatti - 625 115

SETHU INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

B.TECH INFORMATION TECHNOLOGY

REGULATIONS 2019

Revised Curriculum after BoS

OVERALL COURSE STRUCTURE

Code	Category	Total No. of Courses	Credits	Percentage
BS	Basic Sciences	10	28.5	16.76
ES	Engineering Sciences	9	24.5	14.41
HSS	Humanities and Social Sciences	5	9.5	5.58
PC	Professional Core (including Lab Courses)	19	62.5	36.76
PE	Professional Elective	6	18	10.58
OE	Open Elective	4	12	7.05
PW	Project Work, Seminar & Internship	5	15	8.82
MC	Mandatory Courses	5	_	_
	TOTAL	**63**	**170**	**100**

COURSE CREDITS – SEMESTERWISE

Branch	I	II	III	IV	V	VI	VII	VIII	TOTAL
IT	**23**	**20.5**	**23**	**24**	**25.5**	**23**	**17**	**14**	**170**

Department of Information Technology

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IT	**23**	**20.5**	**23**	**24**	**25.5**	**23**	**17**	**14**	**170**

Semester I

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UEN101	English for Technical Communication	2	0	0	2	Humanities and Social Science
19UMA102	Engineering Mathematics – 1 **(**Common to ALL Branches)	3	1	0	4	Basic Science
19UPH103	Engineering Physics **(**Common to ALL Branches)	3	0	0	3	Basic Science
19UCY105	Applied Chemistry (Common to BME, ECE, EEE, CSE & IT)	3	0	0	3	Basic Science
19UCS108	Problem Solving and Python Programming (Common to ALL Branches)	3	0	0	3	Engineering Science
19UME109	Engineering Graphics (Common to ALL Branches)	3	1	0	4	Engineering Science
19UGM131	Induction Programme (Common to ALL Branches)	0	3	0	0	Mandatory Course
PRACTICAL						
19UGS113	Basic Sciences Laboratory	0	0	2	1	Basic Science
19UCS112	Engineering Fundamentals Laboratory(Common to CSE, ECE,IT & BME Branches)	0	0	3	1.5	Engineering Science
19UCS110	Problem Solving and Python Programming Laboratory (Common to ALL Branches)	0	0	3	1.5	Engineering Science
	TOTAL	**17**	**5**	**8**	**23**	
Total No of Credits - 23						

Semester II

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UEN201	Communication Skills for Professionals	1	0	1	1.5	Humanities and Social Science
19UMA203	Differential Equations and Complex Analysis (Common to CSE & IT)	3	1	0	4	Basic Science
19UPH205	Physics for Information Science(Common to EEE, CSE & IT branches)	3	0	0	3	Basic Science
19UCY204	Environmental Science(Common to all branches)	3	0	3	3	Humanities and Social Science
19UIT206	Introduction to Information Technology	3	0	0	3	Engineering Science

19UIT205	Programming Fundamentals using Python (Integrated Course Offered by Infosys - InfyTQ)	3	0	3	4.5	Engineering Science
PRACTICAL						
19UGS210	Energy and Environmental Science Laboratory(Common to ALL Branches)	0	0	3	1.5	Basic Science
	TOTAL	**16**	**1**	**10**	**20.5**	
Total No of Credits - 20.5						

Semester III

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UMA322	Probability, Queueing Theory and Numerical Methods (Common to CSE & IT)	3	1	0	4	Basic Science
19UIT302	Data Structures and Algorithms	3	0	0	3	Professional Core
19UIT303	C Programming (Integrated Course)	3	0	3	4.5	Professional Core
19UIT304	Digital Principles and System Design	3	0	0	3	Engineering Science
19UIT305	Principles of Operating Systems (Integrated Course)	3	0	1	4	Professional Core
19UIT306	Software Engineering Methodology	3	0	0	3	Professional Core
PRACTICAL						
19UIT307	Data Structures and Algorithms Laboratory	0	0	3	1.5	Professional Core
MANDATORY						
19UGM332	Biology for Engineering Applications	2	0	0	P/F	Mandatory Course
	TOTAL	**20**	**1**	**7**	**23**	
Total No of Credits - 23						

Semester IV

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UMA421	Transforms and Discrete Mathematics (Common to CSE&IT)	3	1	0	4	Basic Science
19UIT402	Design Methods and Analysis of Algorithms	3	0	0	3	Professional Core

19UIT403	Object Oriented Programming in C++ (Integrated Course)	3	0	3	4.5	Professional Core
19UIT404	Database Management Systems (Integrated Course)	3	0	3	4.5	Professional Core
19UIT405	Computer Organization and Architecture	3	0	0	3	Professional Core
19UIT406	Computer Networks (Integrated Course)	3	0	1	4	Professional Core
PRACTICAL						
19UIT407	Seminar	0	0	2	1	Project Work
MANDATORY						
19UGM431	Gender Equality	1	0	0	P/F	Mandatory Course
	TOTAL	**19**	**1**	**9**	**24**	
Total No of Credits - 24						

Semester V

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UIT501	Object Oriented Programming using Python (Integrated Course) Offered by Infosys - InfyTQ	3	0	3	4.5	Professional Core
19UIT502	Cyber SecurityManagement	3	0	0	3	Professional Core
19UIT503	Mining and Analysis of Big Data	3	0	0	3	Professional Core
19UIT504	Microprocessor Based System Design	3	0	0	3	Engineering Science
	Professional Elective I	3	0	0	3	Professional Elective
	Open Elective I	3	0	0	3	Open Elective
19UGS531	Reasoning and Aptitude	1	0	0	1	Basic Science
PRACTICAL						
19UIT507	Creative Thinking and Innovation	0	0	2	1	Project Work
19UIT508	Mining and Analysis of Big Data Laboratory	0	0	3	1.5	Professional Core
19UIT509	Microprocessor Based System Design Laboratory	0	0	2	1	Engineering Science
19UGS532	Soft Skills Laboratory	0	0	3	1.5	Humanities and Social Science
	TOTAL	**19**	**0**	**13**	**25.5**	
Total No of Credits – 25.5						

Semester VI

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UIT601	Java Programming (Integrated Course)	3	0	3	4.5	Professional Core
19UIT602	Artificial Intelligence	3	0	0	3	Professional Core
	Professional Elective II	3	0	0	3	Professional Elective
	Professional Elective III	3	0	0	3	Professional Elective
	Open Elective II	3	0	0	3	Open Elective
PRACTICAL						
19UIT608	Artificial Intelligence Laboratory	0	0	2	1	Professional Core
19UGS633	Interpersonal Skills Development Laboratory	0	0	3	1.5	Humanities and Social Science
19UIT607	Product Development Project (Common to all Branches)	0	0	8	4	Project Work
MANDATORY						
19UGM632	Indian Constitution and Essence of Indian Traditional Knowledge in Information and Communication Engineering	1	0	0	P/F	Mandatory Course
	TOTAL	**16**	**0**	**16**	**23**	
Total No of Credits - 23						

Semester VII

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UME701	Project Management and Finance	3	0	0	3	Professional Core
19UIT702	Internet of Things Systems and Applications(Integrated Course)	3	0	2	4	Professional Core
	Professional Elective IV	3	0	0	3	Professional Elective
	Professional Elective V	3	0	0	3	Professional Elective
	Open Elective III	3	0	0	3	Open Elective
PRACTICAL						
19UIT707	Summer Internship	0	0	0	1	Project Work
MANDATORY						
19UGM731	Professional Ethics and Human Values	2	0	0	P/F	Mandatory Course
	TOTAL	**17**	**0**	**2**	**17**	
Total No of Credits - 17						

Semester VIII

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
	Professional Elective VI	3	0	0	3	Professional Elective
	Open Elective IV	3	0	0	3	Open Elective
PRACTICAL						
19UIT801	Project Work	0	0	12	8	Project Work
	TOTAL	**6**	**0**	**12**	**14**	
Total No of Credits - 14						

Professional Elective

Course Code	Course Title	L	T	P	C
19UIT901	Machine Learning Algorithms and Applications	3	0	0	3
19UIT902	Internet Technology and Web Design (Integrated Course)	2	0	2	3
19UIT903	Insight in to Cloud Computing (Integrated Course)	2	0	2	3
19UIT904	Graphics and Multimedia (Integrated Course)	2	0	2	3
19UIT905	Introduction to Human Computer Interaction	3	0	0	3
19UIT906	Fundamentals of Image Processing(Integrated Course)	2	0	2	3
19UIT907	Mobile Application Development (Integrated Course)	2	0	2	3
19UIT908	Introduction to Embedded Systems	3	0	0	3
19UIT909	Green Information Technology	3	0	0	3
19UIT910	Wireless Communication	3	0	0	3
19UIT911	Building Enterprise Applications	3	0	0	3
19UIT912	Software Testing	3	0	0	3
19UIT913	System Software Internals	3	0	0	3
19UIT914	Enterprise Architecture	3	0	0	3
19UIT915	Free and Open Source Software	3	0	0	3
19UIT916	Web Mining and Social Networks	3	0	0	3
19UIT917	Ethical Hacking and Information Forensics	3	0	0	3
19UIT918	Neuro Fuzzy Systems	3	0	0	3
19UIT919	Information RetrievalTechniques	3	0	0	3
19UIT920	Visualization Technologies	3	0	0	3
19UIT921	Nature and Bio-Inspired Computing	3	0	0	3
19UIT922	Unix Internals	3	0	0	3
19UIT923	Object Oriented System Design	3	0	0	3
19UIT924	Robotics	3	0	0	3

INTER DISCIPLINARY ELECTIVE COURSE

Course Code	Course Title	L	T	P	C
19UGM951	Smart Manufacturing (Common to IT &Mech)	3	0	0	3
19UGM953	Big Data And Iot In Medical Applications (Common to IT & Bio-Medical)	3	0	0	3

MULTIDISCIPLINARY ELECTIVE COURSE

Course Code	Course Title	L	T	P	C
19UGM952	Automation in Agriculture (Common to Mech, IT &Agri)	3	0	0	3

ONE CREDIT COURSES

Course Code	Course Title	L	T	P	C
19UIT861	IT- Infrastructure Management Service	1	0	0	1
19UIT862	Introduction to 3D Animation	0	0	2	1
19UIT863	Web Programming with PHP	0	0	2	1
19UIT864	Android Programming – I	0	0	2	1
19UIT865	Android Programming – II	0	0	2	1
19UIT866	Foundation Program 5.0	1	0	0	1
19UIT867	Logics of Programming	0	0	2	1
19UIT868	Arduino Raspberry Pi	0	0	2	1
19UIT869	No SQL	0	0	2	1
19UIT870	PHP Fundamentals	0	0	2	1
19UIT871	Emotional Intelligence	1	0	0	1
19UIT872	UI Design	1	0	0	1

OPEN ELECTIVE COURSES

Course Code	Course Title	L	T	P	C
19UIT971	PC Troubleshooting	3	0	0	3
19UIT972	Social Networks	3	0	0	3
19UIT973	Cyber Forensics Technology	3	0	0	3
19UIT974	Animation Technology	3	0	0	3
19UIT975	Computer architecture	3	0	0	3
19UIT976	Fundamentals of Database Management Systems	3	0	0	3
19UIT977	Learning IT Essentials by Doing	3	0	0	3
19UIT978	Website Designing	3	0	0	3

COURSES OFFERED TO OTHER DEPARTMENTS

Course Code	Course Title	L	T	P	C	Offered Dept
19UIT326	Fundamentals of C Programming (Integrated Course)	2	0	2	3	ECE
19UIT426	Data Structure using C (Integrated Course)	3	0	3	4.5	EEE
19UIT427	Object Oriented Programming in Python	3	0	0	3	AGRI
19UIT428	Object Oriented Programming in Python Laboratory	0	0	2	1.5	AGRI
19UIT429	Introduction to Data Structures and Algorithms (Integrated Course)	2	0	2	3	ECE
19UIT623	Object Oriented Programming and Data Structures	2	0	3	3.5	Bio-Medical

Semester I

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THEORY						
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PRACTICAL						
19UGS113	Basic Sciences Laboratory	0	0	2	1	Basic Science
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	TOTAL	**17**	**5**	**8**	**23**	
Total No of Credits - 23						

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

COURSE DESIGNATION :

PRE-REQUISTIES:

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**

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**

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 **7**

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**

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, **VocabularyDevelopment** – One word substitution.

Total: 30 Periods

COURSE OUTCOMES:

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

- Use grammar effectively in speaking and writing.
- Exhibit improved reading comprehension and vocabulary.
- Improve writing skills in formal situations.

- Develop speaking ability in both formal and informal occasions.
- Write reports on various purposes.

TEXT BOOKS:

1. KN Shoba, Lourdes Joavani Rayen, Communicative English, New Delhi,

CambridgeUniversity 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)	L	T	P	C
		3	1	0	4

COURSE DESIGNATION :
PRE-REQUISTIES:
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

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

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 8+3

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

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

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**

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. (CO1) AP – K3.
- Analyze functions using limits, continuity, derivatives and to solve Physical application problems.(CO2) A – K4
- Apply differentiation techniques and Lagrange multiplier method to predict the extreme values of the functions with constrain.(CO3) AP – K3
- Apply the concept of some special function like Gamma, Beta function and their relation to evaluate some definite integral.(CO4) AP – K3
- Apply integration to compute Multiple integrals, Area and Volume in addition to change of order and change of variables.(CO5) AP – K3
- Understand the basic concept in Matrix, Differentiation and Integration. (CO6) U – K2

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", Motilal Banarsidass 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

COURSE DESIGNATION :

PRE-REQUISTIES:

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 on properties of materials

UNIT I CRYSTAL STRUCTURE 12

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 –Point defects-Line defects-Surface defects-Volume defects Burger vector.

UNIT II PHOTONICS 10

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

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

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 :

- Apply the crystal growth techniques
- Acquire knowledge about Lasers
- Summarize the principles of Quantum concepts
- Analyze the nature of the materials

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 Common to (BME, ECE, EEE, CSE & IT)	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To gain the knowledge on Chemical bonding and types.
- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- To know the importance of smart material and green chemistry.
- To acquire knowledge on energy storage devices.

UNIT I CHEMICAL BONDING 11

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 Waals forces.

UNIT II WATER AND ITS TREATMENT TECHNOLOGIES 11

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 AND GREEN CHEMISTRY 11

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 12

Batteries, fuel cells and super capacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – H_2 - O_2 fuel cell and application.

Total: 45Periods

COURSE OUTCOMES:

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

- Gain knowledge in chemical bonding and types
- Provide a strong platform to understand the water quality parameters and treatment methods.
- Have sound knowledge on Smart material and Green Chemistry.
- Explore the principles of various storage devices.

TEXT BOOKS:

1. Jain P.C. and Monica Jain, “Engineering Chemistry”, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2002.
2. Dr.Sunita Rattan, “A Textbook of Engineering Chemistry” S.K.Kataria & Sons., NewDelhi, 2013.

REFERENCE BOOKS:

1. Derek Pletcher and Frank C. Walsh, “Industrial Electrochemistry”, Chapman and Hall, New York, 1993.
2. Peter Grundler, “ Chemical Sensors – An introduction for Scientists and Engineers”, Springer, New York, 2007.

19UCS108	PROBLEM SOLVING AND PYTHON PROGRAMMING (COMMON TO ALL BRANCHES)	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

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 9

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 9

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 9

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 9

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 9

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: 45 Periods

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.

19UME108	ENGINEERING GRAPHICS (COMMON TO ALL BRANCHES)	L	T	P	C
		3	1	0	4

COURSE DESIGNATION :

PRE-REQUISTIES:

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 technical drawings.
- To impart knowledge in development of surfaces, isometric and perspective projections

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) **4**

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** **6+6**

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

UNIT II **SECTION OF SOLIDS** **4+6**

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

UNIT III **DEVELOPMENT OF SURFACES** **4+6**

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** **6+6**

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

UNIT V **ORTHOGRAPHIC PROJECTION** **6+6**

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 (P) = 60Periods

COURSE OUTCOMES:

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

- Apply the knowledge of First angle projection to draw the projection of points, straight lines and planes.(Apply)
- Draw the Projection of different simple solids.(Apply)
- Draw the section of solids and development of lateral surfaces of solids.(Apply)
- Apply the knowledge of Isometric projection to draw the objects like truncated solids and frustum.(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), Subhas Publications.(1998).
3. DhananjayA.Jolhe, “Engineering Drawing with an introduction to Auto CAD”, Tata McGraw Hill Publishing Company Limited,(2008).

19UGM131	INDUCTION PROGRAMME (COMMON TO ALL BRANCHES)	L	T	P	C
		0	3	0	0

COURSE DESIGNATION :

PRE-REQUISTIES:

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**

Zumba-Bokwa Fitness – Yoga – Mediation – Fine Arts

UNIT II **CREATIVE ARTS** **5**

Painting – Class Painting – Wall Painting – Art from waste

UNIT III **UNIVERSAL HUMAN VALUES & EMINENT SPEAKERS** **5**

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**

Toastmaster club meet

UNIT VI **INDUSTRIAL & LOCAL VISIT** **8**

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

UNIT VII **FAMILIARIZATION OF THE DEPARTMENT AND INNOVATION** **2**

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

Total: 45 Periods

(3 Weeks Model curriculum
As per AICTE)

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 BOOKS:

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

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

PHYSICS LABORATORY

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

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 and compressibility of Liquid.
3. Poiseuille's method - Determination of Coef□cient 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.

A minimum of FIVE experiments shall be offered

COURSE OUTCOMES:

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

- Determine the thickness of various micro level objects using air wedge method.
- Analyze the viscous properties of various liquids using Poiseuille's method.
- Compare the velocity of ultrasonic waves in various liquids by ultrasonic interferometer method.

CHEMISTRY LABORATORY

COURSE OBJECTIVES:

- 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 metal ions.

LIST OF EXPERIMENTS
(Common to All Branches)

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 of Acids
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

A minimum of FIVE experiments shall be offered for every course

Total: 30Periods

COURSE OUTCOMES:

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

- Estimate the ions present in the given sample
- Determine the rate of corrosion, molecular weight and amount of solids in water
- Asses the water quality parameters

19UCS112	ENGINEERING FUNDAMENTALS LABORATORY (COMMON TO CSE, ECE,IT & BME BRANCHES)	L	T	P	C
		0	0	3	1.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

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

GROUPA(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
- Con□guring the computer to connect with internet
- PC trouble shooting and maintenance

GROUP B (ELECTRICAL & ELECTRONICS) **21 Periods**

- Study of electronic components and equipments-
- Resistor color coding
- 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 micro controller
- Switch control with micro controller
- Temperature measurement with micro controller

Total: 45Periods

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 (IM35 or DHT11)	5
12.	PC With Windows 7	3

19UCS110	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY (COMMON TO ALL BRANCHES)	L	T	P	C
		0	0	3	1.5

COURSE DESIGNATION :
PRE-REQUISTIES:
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 of 180. 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 project 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 called, what would be the result?

   - If only 15 seats are called, 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 5th 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 □ve 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:

    I. Move a tower of height-1 to an intermediate pole, using the final pole.
    II. Move the remaining disk to the final pole.
    III. 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 theselected 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. 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: 45Periods

COURSE OUTCOMES:

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

- Formulatealgorithmsforsimpleproblemsandtranslatethealgorithmstoaworking program[Apply]
- Formulatealgorithmsandprogramsforarithmeticcomputationsandsequential logic[Apply]
- Write iterative programs using controlconstructs[Apply]
- Develop programs using functions, packages and use recursion to reduce redundancy[Apply]
- Representdatausinglists,tuples,dictionariesandmanipulatethemthroughaprogram [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) EDITOR – IDLE

Semester II

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UEN201	Communication Skills for Professionals	1	0	1	1.5	Humanities and Social Science
19UMA203	Differential Equations and Complex Analysis (Common to CSE & IT)	3	1	0	4	Basic Science
19UPH205	Physics for Information Science (Common to EEE, CSE & IT branches)	3	0	0	3	Basic Science
19UCY204	Environmental Science (Common to all branches)	3	0	3	3	Humanities and Social Science
19UIT206	Introduction to Information Technology	3	0	0	3	Engineering Science
19UIT205	Programming Fundamentals using Python (Integrated Course Offered by Infosys - InfyTQ)	3	0	3	4.5	Engineering Science
PRACTICAL						
19UGS210	Energy and Environmental Science Laboratory(Common to ALL Branches)	0	0	3	1.5	Basic Science
	TOTAL	**16**	**1**	**10**	**20.5**	
Total No of Credits - 20.5						

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

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

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

PROJECT I **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 II **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 III **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 IV **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 V **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 :

- Overcome their inhibition in Language skills.
- Select the right words and sentence to communicate ideas clearly and accurately.
- Behave with good postures and proper attire.
- Use visual aids correctly with confidence.
- Inspire the audience with your noble motives.

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

COURSE DESIGNATION :

PRE-REQUISTIES:

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 8+3

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 8+3

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 8+3

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

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

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

SUPPLEMENT TOPIC (for internalevaluation only)
Evocation / Application of Mathematics.

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

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.(CO1) AP – K3
- Apply the concept of vector identities in problem solving and evaluate the line, surface and volume integrals.(CO2) AP – K3
- Apply the knowledge of standard techniques of complex variables and mapping for evaluating analytically.(CO3) AP – K3
- Apply the knowledge of singularities, residues in complex integration.(CO4) AP – K3
- Apply the knowledge of partial differential equation in solving linear, higher order and one dimensional Wave equation. (CO5). AP – K3
- Understand the knowledge of Cauchy Riemen equations, poles, homogeneous and non-homogeneous equation. (CO6) U-K2

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

COURSE DESIGNATION :

PRE-REQUISTIES:

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

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 10

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 13

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

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

Total: 45Periods

COURSE OUTCOMES:

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

- Summarize the structure, properties, performance, and processing of conductors tosolve engineering problems.
- Understand how semiconducting materials are influencing in engineering design. Know the concepts of magnetic storage devices and energy storage in Dielectrics.
- Recognize and classify the structures of Optical fiber and types.

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. Aruldoss .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	ENVIRONMENTAL SCIENCE (COMMON TO ALL BRANCHES)	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To understand the concepts of environment and ecosystem.
- To acquire knowledge about the impact of environmental pollution.
- To understand the importance of environmental issues in the society.
- To gain knowledge about the impact of environment related to human health.
- To gain knowledge in alternative energies.

UNIT I ENVIRONMENT AND ECOSYSTEMS 9

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

UNIT II ENVIRONMENTAL POLLUTION 9

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

UNIT III SOCIAL ISSUES AND THE ENVIRONMENT 9

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 AND THE ENVIRONMENT 9

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 POLICY AND ALTERNATIVES 9

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

Total: 45Periods

COURSE OUTCOMES:

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

- Comprehend the importance of environmental impact on environment and ecosystem.
- Understand current environmental challenges like pollution and its management.
- Perform their role in protecting the environment from social issues.
- Learn the importance of population explosion and its controlling measures.
- Remembering the fundamentals of physical and biological principles that govern natural processes

TEXT BOOKS:

1. Anubha Kaushik, 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 and Science', Pearson Education,Upper saddle River, New Jersey, 2008.
2. Miller T.G. Jr., Environmental Science”, Wadsworth Publishing Company, Belmont, California, 2005.
3. De A.K., “Environmental Chemistry”, Wiley Eastern Ltd., New Delhi, 2001.
4. Trivedi R.K., Goel P.K., “Introduction to Air Pollution”, Techno-Science Publication,Jaipur, 2005.

19UIT205	PROGRAMMING FUNDAMENTALS USING PYTHON (INTEGRATED COURSE OFFERED BY INFOSYS - INFYTQ)	L	T	P	C
		3	0	3	4.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To enhance the problem solving skill using python as a platform.
- To work with python libraries for time conventional programming.
- To work with file systems and exception handling.

UNIT I INTRODUCTION TO PROGRAMMING 8+8

Problem Solving – Algorithms-pseudo code-Variables – Data types and Operators - Decision constructs - Iteration constructs - Implicit/Explicit Type conversions - Case Study

Lab Experiments:

1. Implement Simple Python Programs
2. Implement Python programs using Decision constructs
3. Implement Python Programs using Iteration constructs

UNIT II COLLECTIONS 10+10

Introduction to Collections- List and Array –Tuple – Introduction to PYTEST –String – Set - Dictionary: Functions as Objects - Global Variables – Introduction to Debugging - Case Study

Lab Experiments:

1. Implement Python Programs using Arrays and Lists
2. Implement Python Programs using set and tuples
3. Implement Python Programs using Dictionary

UNIT III FUNCTIONS 8+8

Argument behavior -optional arguments – Variables and its scope – Introduction to parameterized pytest - Types of arguments – Recursive Functions - Case Study

Lab Experiments:

1. Implement Python Programs using Functions

UNIT IV CODE ORGANIZATION AND LIBRARIES 9+9

Modules and packages -Random Library – Math Library – String Functions – List Functions – Dictionary Functions – Date and Time Functions - Case Study

Lab Experiments:

1. Implement Programs to demonstrate python modules and Packages

UNIT V HANDLING FILES AND HIGHER ORDER FUNCTIONS 10+10

Introduction to File Handling – Handling Exceptions in code – Regular Expressions – Concurrency – Lambda Expressions – Higher Order Functions - Case Study

Lab Experiments:

1. Implement a Program to demonstrate File Handling in Python
2. Implement a program to demonstrate Exception Handling in Python
3. Implement a program to demonstrate Regular Expressions and Lambda Expressions in Python.
4. Implement a program to demonstrate Higher Order Functions in Python.

Total: 90 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy level	Domain	PO & PSO Mapping
CO1	Explain the Fundamentals of python.	Understand	Cognitive	-
CO2	Apply the problem solving skills in python.	Apply	Cognitive	PO1, PSO1
CO3	Analyze various features of python programming for a given scenario	Analyze	Cognitive	PO2, PSO1
CO4	Develop solutions for any complex engineering problems using python.	Create	Cognitive	PO3, PSO1
CO5	Investigate various functions for given scenario	Evaluate	Cognitive	PO4, PSO1

TEXT / REFERENCE BOOKS:

1. url:https://infytq.infosys.com/toc/lex_auth_012540961624342528106 1
2. Anurag Gupta & G P Biswas, “Python Programming – Problem solving, packages and libraries”, McGraw Hill Education, 2020 (copyright).
3. Ashok NamdevKamthane & Amit Ashok Kamthane, “Problem solving and python programming”, McGraw Hill Education, 2018 (copyright)

19UIT206	INTRODUCTION TO INFORMATION TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To impart the knowledge of fundamentals of Information Technology.
- To acquire the fundamental knowledge in Electrical and Electronics.
- To gain the basic core knowledge of Networking.
- To understand the main components of an Operating System & their functions.
- To gain exposure to the fundamental architecture of DBMS and database.

UNIT I INFORMATION TECHNOLOGY BASICS 8

Introduction, Need for Information Storage and Processing, Information Technology Components, Role of Information Technology, Information Technology and the Internet

UNIT II BASICS OF ELECTRICAL AND ELECTRONICS 13

Fundamental laws of electric circuits – Introduction to AC, DC circuits – Operating principles of indicating instruments – Basic Equations and applications of DC Generators. Basic Number System – Boolean algebra theorems – Digital circuits – Flip Flops – Registers and Counters – Elements of Communication Systems – Modulation and Demodulation – Principles of Amplitude and Frequency Modulation – Digital Communications

UNIT III BASICS OF NETWORKING 8

Introduction, Internet Evolution, Basic Internet Terminology, Data over Internet, Modes of Data Transmission, Types of Networks, Types of Topologies, Protocols used in the Internet.

UNIT IV FUNDAMENTALS OF COMPUTER SOFTWARE 8

Introduction-Operating system overview-what OS do, Operating system structure and Operations, Process management, Memory management and Storage management, Process Concept, Process scheduling, Operations on Processes.

UNIT V BASICS OF DATABASE 8

Introduction-History of database systems, database systems applications, view of data, Data models, database languages, database system versus file system, Transaction management, database system structure, data base system architecture-centralized and client server architecture, server system architecture, parallel systems, distributed systems.

Total: 45 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Explain the basic concepts and terminologies of Information Technology	Understand	Cognitive	-
CO2	Apply theoretical foundation of Information Technology	Apply	Cognitive	PO1
CO3	Analyze various principles of Information and Communication Technology	Analyze	Cognitive	PO2,PSO2
CO4	Design a database with its functional behavior and management of Information Technology components for a given scenario	Create	Cognitive	PO3,PSO1
CO5	Investigate the basic ideologies of networking, Process scheduling and database systems.	Evaluate	Cognitive	PO4
CO6	Conduct experiments on Data base and Networks by using modern IT tools	Apply	Cognitive	PO5

TEXT BOOKS:

1. Fundamentals of Information Technology, Wiley India Editorial Team.
2. Behrouz A. Forouzan,"Data communication and networking ", McGraw-Hill Higher Education,4th Edition,2010.
3. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts" ,John Wiley& Sons (ASIA) Pvt. Ltd, 9th Edition,2010.
4. Silberschatz,Korth,Sudarshan," Database system concepts", McGraw-Hill, 4th Ed.

REFERENCE BOOKS:

1. R.K.Rajput,"Basic electrical and electronics engineering", Secondedition,University science press.
2. Larry Peterson and Bruce Davie," Computer Networks: A Systems Approach" Morgan Kaufmann, 5th Edition (2011).

19UGS210	ENERGY AND ENVIRONMENTAL SCIENCE LABORATORY (COMMON TO ALL BRANCHES)	L	T	P	C
		0	0	3	1.5

PHYSICS LABORATORY

COURSE OBJECTIVES:

- To analyze the Band gap, moment of inertia, thermal conductivity and rigidity modulus of the materials.
- To gain knowledge in PHOTONICS.

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 cellCharacteristics using optical transducers kit.

A minimum of FIVE experiments shall be offered

COURSE OUTCOMES:

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

- Calculate energy band gap by using semiconductor diode
- Apply principles of elasticity for engineering applications.
- Analyze the properties of optical fiber for communication

CHEMISTRY LABORATORY

COURSE OBJECTIVE:

- 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.

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.

COURSE OUTCOMES:

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

- Analyze the properties of water by applying the chemical concepts.
- Determine the amount of acid in the industrial effluents.
- Use specific methods to analyze the dissolved oxygen in water.

A minimum of FIVE experiments shall be offered

Laboratory classes on alternate weeks for Physics and Chemistry.

Total: 45Periods

Semester III

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UMA322	Probability, Statistics and Queuing Systems (Common to CSE & IT)	3	1	0	4	Basic Science
19UIT302	Data structures and Algorithms	3	0	0	3	Professional Core
19UIT303	C Programming (Integrated Course)	3	0	3	4.5	Professional Core
19UIT304	Digital Principles and System Design	3	0	0	3	Engineering Science
19UIT305	Principles of Operating Systems (Integrated Course)	3	0	1	4	Professional Core
19UIT306	Software Engineering Methodology	3	0	0	3	Professional Core
PRACTICAL						
19UIT307	Data structures and Algorithms Laboratory	0	0	3	1.5	Professional Core
MANDATORY COURSE						
19UGM332	Biology for Engineering Applications	2	0	0	P/F	Mandatory Course
	TOTAL	**20**	**1**	**7**	**23**	
Total No of Credits - 23						

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

COURSE DESIGNATION :
PRE-REQUISTIES:
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

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 CURVE FITTING 9+3

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 III QUEUEING THEORY 9+3

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

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

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 . (CO1) AP – K3
- Analyze the characteristic features queuing systems and queuing models and computer system.(CO2) A – K4
- Apply method of least square and method of moments to fit a straight line and a curve. (CO3). AP – K3
- Apply numerical techniques to solve linear, nonlinear equations and Eigen value problems of a Matrix by Numerically. (CO4) AP – K3
- Apply numerical techniques and methods for solving first and second order Ordinary Differential Equation Numerically. (CO5). AP – K3
- Understand the concept of axioms of probability, Markovian queue and Averages. (CO6) U-K2

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. SUBRAMANIAN .N " Probability and Queueing Theory " SCM Publishers 2010.
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, 8th Edition, (2011).
5. SUBRAMANIAN .N "Probability and Queueing Theory ", SCM Publishers 2010.

19UIT302	DATA STRUCTURES AND ALGORITHMS	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To introduce the fundamental concept of data structures
- To impart a thorough understanding of linear non-linear data structures such as list, stacks, queues, trees, graphs and their applications.
- To impart familiarity with various sorting, searching and hashing techniques

UNIT I LINEAR DATA STRUCUTRE – ARRAYS, LIST **10**

Abstract Data Type – Approaches to design an Algorithm – Complexity – Arrays: Accessing Elements – Operations – Passing Arrays to functions – Array of pointers – 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 STRUCUTRE – STACK, QUEUE **10**

Stack ADT: Array & Linked Representation - Applications of Stack - Balancing Parenthesis - Arithmetic expressions (Conversion & Evaluation) - Recursion - Queue ADT: Array & Linked Representation – Double Ended Queue – Applications of Queue.

UNIT III NON-LINEAR DATA STRUCUTRE – TREE,HEAP **9**

Introduction – Basic Terminology – Traversal – Operations: Binary trees – Binary Search trees – AVL trees- Red-Black trees – B-trees. Heap: Binary Heaps – Binomial Heaps – Fibonacci Heaps – Comparison – Applications

UNIT IV NON-LINEAR DATA STRUCTURE – GRAPH **8**

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 SEARCHING, SORTING AND HASHING **8**

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 :

CO. No	Course Outcomes	Taxonomy level	Domain	PO & PSO Mapping
CO1	Describe the basic concepts of data structures and algorithm like linear and non-linear	Understand	Cognitive	-
CO2	Apply appropriate data structure and algorithm design method for a specified application.	Apply	Cognitive	PO1, PSO1
CO3	Compare and contrast alternative data structure applications to select the best process	Analyze	Cognitive	PO2, PSO1
CO4	Design and develop efficient linear, non-linear, sorting, searching and hashing data structure algorithms to solve problems.	Create	Cognitive	PO3, PSO1
CO5	Evaluate the problems and find solutions using linear, non-linear applications, searching, sorting and hashing algorithms.	Evaluate	Cognitive	PO4, PSO1
CO6	Select and apply appropriate data structures to design algorithms using modern tool.	Apply	Cognitive	PO5,9, 10, PSO1

TEXT BOOKS:

1. ReemaThareja, “Data Structures Using C”, Oxford University Press, Second Edition, 2014.
2. Weiss. M.A"Data Structures and Algorithm Analysis in C", Pearson Education, 2nd Edition, 2012

REFERENCE BOOKS:

1. Aaron M.Tenenbaum, YedidyahLangsam, Moshe J.Augenstein, "Data Structures using C", Pearson Education India, 7th Edition, New Delhi, 2009.
2. Aho.V, Hopcroft.J.E, Ullman.J.D, "Data Structures and Algorithms", Pearson Education, 1st Edition Reprint, 2006.
3. Gilberg.R.F, Forouzan.B.A, "Data Structures", Thomson India Education, 2nd Edition, 2005.
4. Sara Baase and A.VanGelder, "Computer Algorithms", Pearson Education, 3rd Edition, 2005.
5. Cormen.T.H, C.A.Leiserson.B.A, R.L.Rivest and C.Stein, "Introduction to Algorithms", Prentice Hall of India, 3rd Edition, 2009.

19UIT303	C PROGRAMMING (INTEGRATED COURSE)	L	T	P	C
		3	0	3	4.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To develop c programs using basic programming constructs
- To develop c programs using functions, array and string
- To develop applications in c using pointers and structures
- To do input/output and file handling in c

UNIT I BASICS OF CPROGRAMMING 8+8

Introduction to C-Introduction, Structure of C program, writing simple C Program, comments, Tokens,Character set, Keywords and Identifiers, Data Types,Variables,Constants,Input and Output statements-Print(),Scanf(),Assignment statement, Operator and its precedence, Decision Control Statements- Conditional Branching Statements, Pre-processor directives.

List of Experiments:

1. Implement Simple C programs
2. Implement c programs using operators
3. Implement C Programs using Decision constructs
4. Implement C Programs using Pre-processor directives

Example Experiments:

1. Temperature of a city in Fahrenheit degrees is input through the keyboard. Write a program to convert this temperature into Centigrade degrees.
2. If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Also determine how much profit he made or loss he incurred.
3. The marks obtained by a student in 5 different subjects are input through the keyboard.
   The student gets a grade as per the following rules:
   Percentage above or equal to 60 - First grade
   Percentage between 50 and 59 - Second grade
   Percentage between 40 and 49 - Third grade
   Percentage less than 40 - Fail
   Write a program to calculate the grade obtained by the student with the use of logical operators
4. Write macro definitions with arguments for calculation of Simple Interest and Amount. Store these macro definitions in a file called “interest.h”. Include this file in your program, and use the macro definitions for calculating simple interest and amount.

UNIT II LOOPINGSTATEMENTS AND FUNCTIONS 9+9

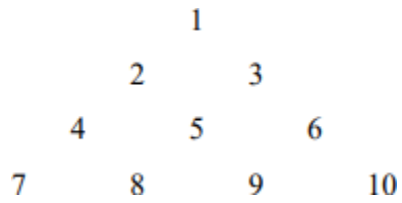
Iterative Statements, Nested Loops, Break and Continue Statements, gotoStatement. Introduction to function-using function, function declaration and definition, function call, return statement, Recursive function, Passing parameter to function, Storage classes.

Experiments:

1. Implement C Programs using Looping statements
2. Implement C Programs using Functions

Example Experiments:

1. Write a program to produce the following output:



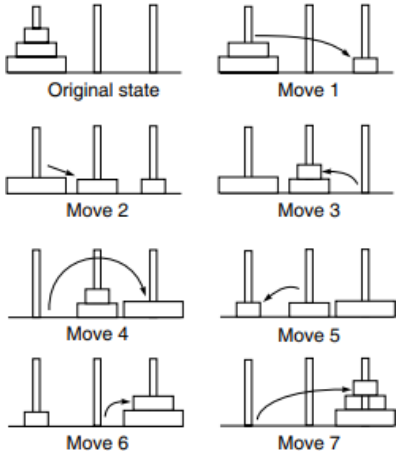
2. Write a program which to find the grace marks for a student using switch. The user should enter the class obtained by the student and the number of subjects he has failed in.
    a) If the student gets first class and the number of subjects he failed in is greater than 3, then he does not get any grace. If the number of subjects he failed in is less than or equal to 3 then the grace is of 5 marks per subject.
    b) If the student gets second class and the number of subjects he failed in is greater than 2, then he does not get any grace. If the number of subjects he failed in is less than or equal to 2 then the grace is of 4 marks per subject.
    c) If the student gets third class and the number of subjects he failed in is greater than 1, then he does not get any grace. If the number of subjects he failed in is equal to 1 then the grace is of 5 marks per subject
3. write a program to produce a "2 times" table from 1 to 12

```
 1 x 2 =  2
 2 x 2 =  4
 3 x 2 =  6
 4 x 2 =  8
 5 x 2 = 10
 6 x 2 = 12
 7 x 2 = 14
 8 x 2 = 16
 9 x 2 = 18
10 x 2 = 20
11 x 2 = 22
12 x 2 = 24
```

Noel-127

4. Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs. 12.00 per hour for every hour worked above 40 hours. Assume that employees do not work for fractional part of an hour. Yashwanth-chap-3
5. The Towers of Hanoi problem is a classic case study in recursion. It involves moving a specified number of disks from one tower to another using a third as an auxiliary ower. Legend has it that at the time of the creation of the world, the priests of the Temple of Brahma were given the problem with 64 disks and told that when they had completed the task, the world would come to an end.
   Move n disks from peg A to peg C, using peg B as needed.
   The following conditions apply.
      a) Only one disk may be moved at a time.
      b) This disk must be the top disk on a peg.

c) A larger disk can never be placed on top of a smaller disk



UNIT III ARRAYS AND STRINGS 10+10

Introduction to Array-Declaration of array, Accessing the elements, operations, passing array to functions, Two dimensional array and operation, multi-dimensional array. Introduction to string-Declaration,Initialization,Printing string, String input, Manipulation/operations on String-Length, Compare, Concatenate, copy, Reverse,Inserting,Indexing&Deleting, Array of strings.

Lab Experiments:

1. Implement C Programs using Arrays
2. Implement C Programs using String and its operations

Example Experiments:

1. Write a program to pick up the largest number from any 5 row by 5 column matrix. Yash-chap-8
2. Given an array p[5], write a function to shift it circularly left by two positions. Thus, if p[0] = 15, p[1]= 30, p[2] = 28, p[3]= 19 and p[4] = 61 then after the shift p[0] = 28, p[1] = 19, p[2] = 61, p[3] = 15 and p[4] = 30. Call this function for a (4 x 5) matrix and get its rows left shifted.
3. The area of a triangle can be computed by the sine law when 2 sides of the triangle and the angle between them are -known
   Area = (1 / 2) ab sin (angle)
   Given the following 6 triangular pieces of land, write a program to find their area and determine which is largest.
   A B Angle

137.4 80.9 0.78

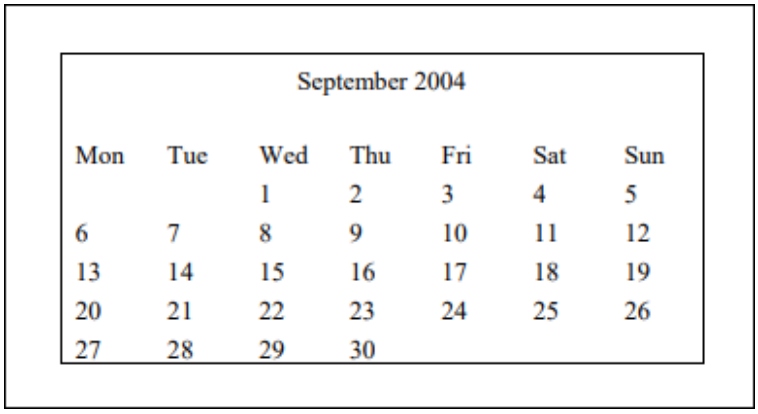
155.2 92.62 0.89

149.3 97.93 1.35
160.0
100.25 9.00

155.6 68.95 1.25

149.7 120.0 1.75

4. Write a program that extracts part of the given string from the specified position. For example, if the sting is "Working with strings is fun", then if from position 4, 4 characters are to be extracted then the program should return string as "king". Moreover, if the position from where the string is to be extracted is given and the number of characters to be extracted is 0 then the program should extract entire string from the specified position.
5. Develop a program that receives the month and year from the keyboard as integers and prints the calendar in the following format.



September 2004

Mon	Tue	Wed	Thu	Fri	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Note that according to the Gregorian calendar 01/01/1900 was Monday. With this as the base the calendar should be generated.

UNIT IV STRUCTURES AND POINTERS 10+10

Introduction to Pointers-Declaring pointer variables, Null pointers and Generic pointers, passing arguments to functions using pointers, Pointers and array, Array of pointers, pointers and string, Pointers to Pointers, Dynamic memory allocation-malloc(), calloc(),realloc(),free(). Introduction to structures, Nested structures, Array of structures, structures and functions, Self -referential structures.

Lab Experiments:

1. Implement C Programs using structures
2. Implement C Programs using pointers

Example experiments:

1. Write a C program to read and display student details using structure.
2. An automobile company has serial number for engine parts starting from AA0 to FF9.

The other characteristics of parts to be specified in a structure are: Year of manufacture, material and quantity manufactured.

(a) Specify a structure to store information corresponding to a part.

(b) Write a program to retrieve information on parts with serial numbers between BB1 and CC6.

3. A record contains name of cricketer, his age, number of test matches that he has played and the average runs that he has scored in each test match. Create an array of structure to hold records of 20 such cricketer and then write a program to read these records and arrange them in ascending order by average runs. Use the qusort( ) standard library function.
4. Write a program in C to count the number of vowels and consonants in a string using a pointer. Link given

UNIT V FILE PROCESSING 8+8

Introduction to files-using files in C,Read data from files, Write data to files, Detecting the End-of-file, Error handling during file operations, accepting command line arguments Functions for Random access-ftell(),fseek(),rewind(),fgetpos(),fsetpos(),remove(),Renaming the file.

Lab Experiments:

1. Implement C Programs that uses files
2. Implement C Programs using Command line arguments

Example experiments:

1. Write a program to compare two files specified by the user, displaying a message indicating whether the files are identical or different.
2. Suppose a file contains student's records with each record containing name and age of a student. Write a program to read these records and display them in sorted order by name.
3. Write a program to find the size of a text file without traversing it character by character.
4. Write a program to display the contents of a text file on the screen. Make following provisions: Display the contents inside a box drawn with opposite corner co-ordinates being (0, 1) and (79, 23). Display the name of the file whose contents are being displayed, and the page numbers in the zeroth row. The moment one screenful of file has been displayed, flash a message 'Press any key...' in 24th row. When a key is hit, the next page's contents should be displayed, and so on till the end of file.
5. A hospital keeps a file of blood donors in which each record has the format:
   Name: 20 Columns
   Address: 40 Columns
   Age: 2 Columns
   Blood Type: 1 Column (Type 1, 2, 3 or 4)
   Write a program to read the file and print a list of all blood donors whose age is below 25 and blood is type 2.

Total: 90 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Infer the Knowledge of fundamental C programming concepts	Understand	Cognitive	-
CO2	Apply various concepts of C program for solving problems	Apply	Cognitive	PO1, PSO1
CO3	Analyze different features of C program for a given scenario	Analyze	Cognitive	PO2
CO4	Design a solution without anomalies using C programming concept for the given applications	Create	Cognitive	PO3, PSO1
CO5	Select and apply appropriate tools to implement any few concepts of C programming	Apply	Cognitive	PO5
CO6	Identify the requirement and take further preparation in order to adopt Technological change.	Value	Affective	PO10, PO12

TEXT BOOKS:

1. ReemaThareja,"Programming in C",2nd Edition,Oxford university press,2015.
2. Yashavant P. Kanetkar,"Let us C",5th Edition,BPB Publications,2004.

REFERENCE BOOKS:

1. Brian.K.Kernighan,Dennis.M.Ritchie,"The C Programming Language",2nd Edition,Pearson,
2. PradipDey, Manas Ghosh, "Computer fundamentals and programming in C", 2nd edition, Oxford university press, 2013.
3. Noel Kalicharan, "Learn to program with C",Apress,2015.

19UIT304	DIGITAL PRINCIPLES AND SYSTEM DESIGN	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- Aims at providing the basic understanding of the fundamentals of digital logic and circuits
- Aims at providing fundamental knowledge of combinational and sequential circuits.
- Aims to equip the students to build digital logic circuits.

UNIT I NUMBER SYSTEM 9

Introduction to number systems – Base conversions - Circuits for arithmetic operations – Binary Adder/ Subtractor / Multiplier – BCD adder – code conversions – Binary to gray - Gray to binary - BCD to Excess-3 code – Computer arithmetic: Floating point representation - Floating point conversions.

UNIT II LOGIC GATES 9

Logic gates - Properties of Boolean algebra - Minimization of Boolean functions - Representation of Boolean functions - Canonical and standard form - Sum of Products form (SOP) – Product of sum form (POS) - K-Map method – Quine Mckulskey method.

UNIT III COMBINATIONAL CIRCUITS 9

Half adder – Full adder – Half subtractor – Full subtractor – Parallel adder – Parallel subtractor – BCD adder – Carry lookahead adder - Encoders and Decoders - Multiplexers and Demultiplxers – Magnitude comparator – Programmable logic array (PLA) – Programmabale Array Logic (PAL) - Read only memory (ROM)

UNIT IV SEQUENTIAL CIRCUITS 9

Introduction to sequential circuits – Latches - Flipflop –SR flipflop – JK flipflop – T Flipflop – D flipflop – Race around condition – Flipflop conversions - Shift registers – Counters – Synchronous UP/DOWN counters – Asynchronous UP/DOWN counters

UNIT V SEQUENTIAL LOGIC 9

Analysis and design procedures of synchronous and asynchronous sequential circuits – state reduction and state assignment – Reduction of state and flow tables – Race free assignments - Hazards

Total: 45 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Gain knowledge between different types of number systems and their conversions and understand the different methods used for the simplification of Boolean functions	Understand	Cognitive	-
CO2	Apply the knowledge of digital logic principles to design and implement various combinational and sequential circuits	Apply	Cognitive	PO1, PSO2
CO3	Analyze different types of digital electronic circuit using various mapping and logical tools and identify the techniques to prepare the most simplified circuit using mapping and mathematical methods	Analysis	Cognitive	PO2, PSO2
CO4	Design different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints	Create	Cognitive	PO3, PSO2
CO5	Assess the nomenclature and technology in the area of memory devices and apply the memory devices in different types of digital circuits for real world application	Evaluate	Cognitive	PO4, PSO2

TEXT BOOKS:

- Morris Mano,"Digital logic and computer design ", Second Edition.

REFERENCE BOOKS:

- Thomas.L.Floyd, "Digital Fundamentals",10th edition

19UIT305	PRINCIPLES OF OPERATING SYSTEMS (INTEGRATED COURSE)	L	T	P	C
		3	0	1	4

COURSE DESIGNATION :
PRE-REQUISTIES:
COURSE OBJECTIVES:

1. To impart major Operating System components and its principles
2. To provide an in-depth exposure to process, memory, device and file management techniques
3. To initiate knowledge on various security challenges related to Operating Systems

UNIT I FUNDAMENTALS AND PROCESS CONCEPTS 9+6

Introduction: Introduction: Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection Operating System operations, Kernel data structures, computing environments.
Operating System structure: Operating System Services, User- Operating System interface, System Calls, Types of system calls, system programs, Operating System design and implementation.
Processes:, Interprocess communication, cooperating Process
Experiments: Shell Programming

UNIT II THREAD MANAGEMENT SCHEDULING AND MUTUAL EXCLUSION 9+6

Threads: Overview, Multithreading models, Threading issues.
Process Synchronization: The critical section problem, Peterson's solution, Mutex locks, Semaphores, Classical problems of synchronization.
CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms
Experiments: Program to illustrate various methods for process and thread handling, Process Synchronization

UNIT III DEADLOCKS & MAIN MEMORYMANAGEMENT 9+6

Deadlocks: System Model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery from deadlock.
Main Memory: Background, swapping, Contiguous memory allocation, Segmentation, Paging, Structure of page table.
Experiments: Bankers Algorithm for Deadlock Avoidance

UNIT IV VIRTUAL MEMORY,FILE SYSTEMS AND DISK MANAGEMENT 9+6

Virtual Memory: Background, Demand paging, Copy on write, Page replacement algorithms, Allocation of frames, Thrashing
File Concepts: File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management- IO Systems- Kernel I/O Subsystems – Mass Storage Structure: Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management
Experiments: Page Replacement Algorithms, File Allocation Strategies

UNIT V SAFETY METHODS AND VIRUTALIZATION 9+6

PROTECTION AND SECURITY : Goals, Principles, Domain, Access Matrix, Access Control, Revocation of access rights and Capability Based Systems Security Problems, Program Threats, System and Network Threats, Cryptography as a security tool
VIRUTALIZATION : Virtual Machines Virtualization (Hardware/Software, Server, Service, Network)

Hypervisors -OS - Container Virtualization - Cost of virtualization

Experiments: Jcrypt tool, Fault Tolerance, High Availability concepts using Cloudsim

Total: 75 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Realize the concepts of operating system structures, services and functionalities.	Understand	Cognitive	-
CO2	Apply Various Process Scheduling Algorithms, Disk Scheduling algorithms, Page replacement algorithms. Deadlock detection and avoidance techniques for providing Operating System functionalities	Apply	Cognitive	PO1, PSO1
CO3	Analyze various process management concepts (including scheduling, synchronization and deadlocks), Memory Management strategies and Design considerations of file system.	Analysis	Cognitive	PO2
CO4	Design solutions for complex engineering processes that meet specified needs with Scheduling, Synchronization, Page replacement and Disk Scheduling algorithms using Programming Language and present the same along with the report	Evaluate	Cognitive	PO4
CO5	Evaluate the Multiprogramming, Synchronization and Virtual Memory Concepts	Evaluate	Cognitive	PO3
CO6	Select and Apply the algorithms used for CPU scheduling, Deadlock using OS sim and shows the concepts of cloud using Virtualization tools	Apply	Cognitive	PO5
CO7	Make an effective communication and presentation in a team to demonstrate the concepts of OS	Value	Affective	PO10

TEXT BOOKS:

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, Operating Systems Concepts,9th Edition, John Wiley Edition

REFERENCE BOOKS:

1. William Stallings,Operating Systems -Internals and Design Principles,7th Edition,Prentice Hall,2012
2. Andrew S.Tanenbaum,Modern Operating System,2014,4th Edition Pearson

19UIT306	SOFTWARE ENGINEERING METHODOLOGY	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :
PRE-REQUISTIES:
COURSE OBJECTIVES:

- To Introduce the phases in a software project
- To Explain the concepts of requirements engineering and Analysis Modeling
  To Explain the major considerations for enterprise integration ,deployment , Testing and Maintenance

UNIT I SOFTWARE PROCESS 9

Introduction to Software Engineering, Software Process, Prescriptive Process Models and Specialized Process Models – Agile Software Development- Agile manifesto and Principles,

UNIT II REQUIREMENT ANALYSIS AND SPECIFICATION 9

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets-Data Dictionary

UNIT III SOFTWARE DESIGN AND DEVELOPMENT 9

Design process – Design Concepts – Design Model-Design Heuristic – Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow – User Interface Design: Interface analysis, Interface Design – Introduction to real time software design – Component level Design: Designing Class based components, traditional Components

UNIT IV SOFTWARE TESTING AND MAINTENANCE 9

Software testing fundamentals – Internal and external views of Testing-white box testing – basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging –Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-**Reengineering** process model-Reverse and Forward Engineering.

UNIT V PROJECT MANAGEMENT 9

Software Project Management: Estimation, Make/Buy Decision,COCOMO-II-Project Planning-Project Scheduling- Risk Management-RMMM Plan- CASE Tools

Total: 45 Periods

COURSE OUTCOMES:

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

CO No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Elaborate the software engineering methodologies and project management techniques	Understand	Cognitive	-
CO2	Apply the software development and management techniques for real time projects in agile scenario	Apply	Cognitive	PO1
CO3	Analyze various software methodologies, design techniques ,testing strategies by means of software project management	Analyze	Cognitive	PO2/PSO1
CO4	Design a process model which suits the business need	Create	Cognitive	PO3
CO5	Evaluate the business cases and risks associated in projects in terms of cost effective methodologies, designs and tests	Evaluate	Cognitive	PO4/PSO2
CO6	Use modern tools to demonstrate the software engineering process	Apply	Cognitive	PO5
CO7	Work individually and as a member in multidisciplinary teams	Value	Affective	PO9
CO8	Communicate effectively with the team in workplace	Respond	Affective	PO10
CO9	Apply Project Management and Financial Techniques to an IT Project	Characterize	Affective	PO11

TEXT BOOKS:

1. Roger Pressman.S, “Software Engineering APractitioner’sApproach”,McGrawHillInternationalEdition,7thEdition,2010.
2. Ian Sommerville, “Software Engineering”, Pearson Education Asia9thedition,2011

REFERENCE BOOKS:

1. RajibMall, ”FundamentalsofSoftwareEngineering”,PHI Learning Private Limited, 3rdEdition, 2009.
2. PankajJalote, ”Software Engineering, A Precise Approach Fundamentals of SoftwareEngineering”,WileyIndia, 2010.
3. Stephen R.Schach, ”Software Engineering”, Tata McGraw-Hill Publishing Company Limited,2007.

19UIT307	DATA STRUCTURES AND ALGORITHMS LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To demonstrate the systematic way of solving problems using linear and non – linear data structures
- To demonstrate the hashing techniques
- To demonstrate the sorting, searching.

LIST OF EXPERIMENTS

1. Implement of linked list
2. Implement Polynomial Arithmetic using Linked List
3. Implement stack ADT using array and linked list
4. Implement stack and use it to convert infix to postfix expression
5. Implement stack and use it to Evaluate postfix expression
6. Implement queue ADT use array and linked list
7. Implement binary search tree
8. Implement insertion and deletion in AVL trees
9. Implement priority queue using binary heaps
10. Implement hashing technique.
11. Implement Prim's algorithm using priority queues to find MST of an undirected graph
12. Implement searching and sorting technique.

Total: 30 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcome	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Apply the linear and non-linear data structures and sorting searching and hashing algorithms appropriately to develop solutions	Apply	Cognitive	PO1, PSO1
CO2	Analyze the different Program to implement various data structure algorithms.	Analyze	Cognitive	PO2, PSO1
CO3	Develop efficient linear, non-linear, sorting, searching and hashing data structure algorithms to solve problems for real world complex engineering problems.	Create	Cognitive	PO3, PSO1
CO4	Work as an individual and as a member or leader in diverse teams for solving data structure problems.	Apply	Cognitive	PO9, PSO1
CO5	Communicate and present various algorithm design techniques for developing algorithms and collaborate with others	Respond	Affective	PO10, PSO1
CO6	Identify the requirement and take further preparation in order to adopt Technological change	Apply	Cognitive	PO11, PSO1

HARDWARE AND SOFTWARE REQUIRMENTS

Computer Required: 30 No's

Minimum Requirement: Processor: Processor: Pentium IV, Ram: 1GB, Hard Disk: 80GB

Software requirements:

Operating System: Linux(Ubuntu / Fedora / Debian / Mint OS) / Windows

Turbo C Version 3 or GCC Version 4 / Built in Linux / DEVC++

19UGM332	BIOLOGY FOR ENGINEERING APPLICATIONS (COMMON TO AGRI, CIVIL, CHEM, ECE, EEE & IT)	L	T	P	C
		2	0	0	P/F

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To provide a basic understanding of biological mechanisms of living organisms and the human biology from the perspective of engineers.
- To encourage engineering students to think about solving biological problems with engineering principles and tools.

UNIT I INTRODUCTION AND CLASSIFICATION 5

Introduction to Biology – Comparison of Biology and Engineering – Eye and Camera – Bird flying and Aircraft – Brownian motion and Thermodynamics – Classification – Unicellular or multicellular – Unicellular: Bacteria, Protozoa, Yeast – Multi Cellular: Animals, Humans, Plants, fungi etc. – Ultra structure: prokaryotes or eukaryotes – Habitat: aquatic or terrestrial.

UNIT II DIGESTIVE & RESPIRATORY SYSTEMS – ENZYME 6

Study of digestive – Respiratory systems and their functions –.Enzyme – Classification of Enzyme – Mechanism of Enzyme activity – Enzymes for Industrial Applications: Waste management – Food processing industry – Beverages – Pharmaceutical – Paper Industry etc.

UNIT III GENETICS AND BIO MOLECULES (BASICS ONLY) 7

Basics of Genes – DNA structure – Genes and hereditary – Genetic Code – Coding and decoding Genetic information – Gene Mapping – Gene Interactions – Mutations – Genetic disorders – Gene therapy – Biomolecules: Carbohydrates, lipids, nucleic acids, proteins. Biological Applications in Engineering: Genetic Algorithm – Computer Application in Genetic Engineering – Genetic Programming – Genetic Computers.

UNIT IV NERVOUS SYSTEM AND CELL SIGNALING 7

Central Nervous System: Brain and Spinal Cord – Peripheral Nervous System – Sensory Division – Motor Division – Neurons – sensory, motor, and interneurons – Signals –Transfer of Information – Bio Signals – Electrocardiography (ECG) – Electroencephalography (EEG) – Electromyography (EMG) – Electrooculography (EOG) – X-ray – CT Scan – MRI scan – Biological Applications in Engineering –Neurons and Neural Network.

UNIT V BIOLOGY AND ITS INDUSTRIAL APPLICATION 5

Bioreactors – Biopharming – Recombinant vaccines – Cloning – Drug discovery –Bioremediation – Biofertilizer – Biocontrol – Biofilters – Biosensors – Biopolymers – Bioenergy – Biomaterials – Biochips.

Total: 30Periods

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 and procedures needed to solve societal issues. [Analyze]

TEXT BOOKS:

1. R.C.Dubey, “A Text book of Biotechnology”, S. Chand Higher Academic Publications, 2013.
2. R. Khandpur, “Biomedical instrumentation - Technology and applications”, McGraw Hill Professional, 2004.

REFERENCE BOOKS

1. Arthur T. Johnson, “Biology for Engineers”, CRC Press, Taylor and Francis, 2nd Edition, 2019.
2. 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.
3. Gerard J. Tortora and Bryan H.Derrickson, “Principles of Anatomy and Physiology”,15thEdition,Wiley publications, 2016.

Semester IV

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UMA421	Transforms and Discrete Mathematics (Common to CSE & IT)	3	1	0	4	Basic Science
19UIT402	Design methods and analysis of Algorithms	3	0	0	3	Professional Core
19UIT403	Object Oriented Programming in C++ (Integrated Course)	3	0	3	4.5	Professional Core
19UIT404	Database Management Systems (Integrated Course)	3	0	3	4.5	Professional Core
19UIT405	Computer Organization and Architecture	3	0	0	3	Professional Core
19UIT406	Computer Networks (Integrated Course)	3	0	1	4	Professional Core
PRACTICAL						
19UIT407	Seminar	0	0	2	1	Project Work
MANDATORY COURSE						
19UGM431	Gender Equality	1	0	0	P/F	Mandatory Course
	TOTAL	**19**	**1**	**9**	**24**	
Total No of Credits - 24						

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

COURSE DESIGNATION :
PRE-REQUISTIES:
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

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

UNIT II COMBINATORICS 9+3

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

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

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

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. (CO1) AP- K3
- Apply the knowledge of induction hypotheses and the principle of basic counting , pigeonhole principle and solving, linear Recurrence relations, generating functions.(CO2) AP – K3
- Apply the knowledge of set with the operations for groups, rings and fields using elementary properties if necessary. (CO3) AP – K3
- Apply the acquired knowledge of Fourier transform and its properties which are used to transform signals between time and frequency domain. (CO4) AP – K3
- Apply the acquired knowledge of Z transform and its properties inverse Z transform and difference equations.(CO5) AP – K3
- Understand the knowledge of principle of counting, continuous and discreate transforms.(CO6) U-K2

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).

19UIT402	DESIGN METHODS AND ANALYSIS OF ALGORITHM	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To impart knowledge on mathematical background for analysis of algorithms and analyze algorithmic performance.
- To impart knowledge about the various advanced design and analysis techniques
- To impart knowledge on paradigms and approaches used to analyze and design algorithms

UNIT I **INTRODUCTION** **9**

Introduction – Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework - Asymptotic Notations and its properties, Mathematical Analysis of Non-recursive and Recursive Algorithms.

UNIT II **SEARCHING AND TRAVERSAL TECHNIQUES** **9**

Brute Force - Selection Sort and Bubble Sort - Sequential Search and Brute-force string matching - Divide and conquer methodology – Merge sort – Quick sort – Binary search – Efficient non - recursive binary tree traversal algorithm, Graph traversals - Breadth first search and Depth first search

UNIT III **ALGORITHMIC TECHNIQUES** **9**

Dynamic Programming – Computing a Binomial Coefficient – Warshall's and Floyd' algorithm – Optimal Binary Search Trees – Greedy Technique– Prim's algorithm- Kruskal's Algorithm- Dijkstra's Algorithm – Huffman Trees

UNIT IV **BACKTRACKING AND BRANCH AND BOUND** **9**

Backtracking – Recursive backtracking algorithm – n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem – Branch and Bound – Assignment problem – Knapsack Problem – Traveling Salesman Problem

UNIT V **COMPUTATIONAL COMPLEXITY AND PARALLEL ALGORITHMS** **9**

Non Deterministic algorithms, The classes P, NP, NP Complete, NP hard Proofs for NP Complete Problems: Clique, Vertex Cover Parallel Algorithms: Introduction, models for parallel computing, Pointer doubling algorithm

Total: 45 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcome	Taxonomy level	Domain	PO & PSO Mapping
CO1	Explain the concept of Notation of Algorithm that apply in various methodologies like brute force divide and Conquer, Greedy Techniques.	Understand	Cognitive	-
CO2	Apply various Methodology based algorithm and different types of searching sorting techniques for providing Betterment solution for the problems.	Apply	Cognitive	PO1, PSO1
CO3	Analyze various methodology based algorithm for enhancing the efficiency of the problem	Analyze	Cognitive	PO2, PSO1
CO4	Analyze different set of problem and to Design a solution using algorithm design methodology	Create	Cognitive	PO3, PSO1
CO5	Evaluate running time, efficiency of the problem using different set of algorithm	Evaluate	Cognitive	PO4, PSO1
CO6	Demonstrate the algorithms with analyzed solution based on time complexity , efficiency and also shows the concepts of difference between different methodology using Virtualization tools	Apply	Cognitive	PO5, PSO1

TEXT BOOKS:

1. Anany Levitin, "Introduction to the Design & Analysis of Algorithm", Pearson Education Asia, Third Edition, 2012.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Computer Algorithms / C++", Universities Press, Second Edition, 2007.

REFERENCE BOOKS:

1. Thomas H Cormen, Charles E.L Leiserson, Ronald L Rivest, Clifford Stein, "Introduction to Algorithm", PHI Pvt. Ltd, Third Edition, 2012.
2. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, Fundamentals of Computer Algorithms, Second Edition, Universities Press, Hyderabad, 2008.
3. Fayez Gebali," Algorithms and Parallel Computing", Willy (Indian Paperback Edition), 2011.
4. Aho.A.V, Hopcroft.J.E, Ullman.J.D, "The Design and Analysis of Computer Algorithms", Pearson Education Asia, Third Edition, 2008.
5. Lee. R.C.T, Tseng.S.S, Chang.R.C, Tsai Y.T, "Introduction to the Design and Analysis of Algorithms A Stretegic Approach", McGraw-Hill Education, First Edition, 2005.

19UIT403	OBJECT ORIENTED PROGRAMMING IN C++ (INTEGRATED COURSE)	L	T	P	C
		3	0	3	4.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To impart the basic knowledge of the fundamentals of programming
- To impart knowledge of classes and methods
- To equip the students to approach programming tasks using techniques learned and write pseudo-code.

UNIT I **9+9**

Basics of C++ programming -Directives – Variables – Type conversions – Operators – Library functions – Loops and Decisions – Control statements – Structures – Enumerations-Functions – Overloaded functions – Recursion -Inline Functions – Default arguments – scope and storage class – Returning by reference.

Case study:

1. Develop a program that displays your favorite poem. Use an appropriate escape sequence for the line breaks.
2. On a certain day the British pound was equivalent to $1.487 U.S., the French franc was $0.172, the German deutschemark was $0.584, and the Japanese yen was $0.00955.Write a program that allows the user to enter an amount in dollars, and then displays this value converted to these four other monetary units.
3. Assume that you want to generate a table of multiples of any given number. Write a program that allows the user to enter the number and then generates the table, formatting it into 10 columns and 20 lines. Interaction with the program should look like this (only the first three lines are shown):

   Enter a number: 7
   7 14 21 28 35 42 49 56 63 70
   77 84 91 98 105 112 119 126 133 140
   147 154 161 168 175 182 189 196 203 210

UNIT II **9+9**

Introduction to object oriented programming – Characteristics of object oriented languages – Classes and objects-Constructors – Default constructor – Parameterized constructor – Copy constructor – Constructor overloading – Returning objects from functions – Structures and classes – Static class data – Destructors

Case study:

4. Write a class definition that creates a class called leverage with one private data member, crowbar, of type int and one public function whose declaration is void pry()
5. Create an employee class. The member data should comprise an int for storing the employee number and a float for storing the employee's compensation. Member functions should allow

the user to enter this data and display it.Write a main() that allows the user to enter data for three employees and display it.

UNIT III **9+9**

Array Fundamentals – Arrays as class member data – Arrays as objects – String Fundamentals – C++ String class – String objects – String functions – Overloading – Method overloading – Operator overloading – Overloading unary and Binary operators – Data conversion – Friend Functions – Static functions – Assignment and copy initialization – this pointer.

Case Study:

6. For a two-dimensional array of type float, called flarr, Develop a program that declares the array and initializes the first subarray to 52, 27, 83; the second to 94, 73, 49; and the third to 3, 6, 1.
7. Develop a program to reverse the word in a given string. For instance, if the input says “hi I am from SIT”, then the output should be “SIT from am I hi”.
8. Develop a program to find the missing element in an array of contiguous elements. For instance, if the input array elements are [2,3,4,6,7], then the missing element is 5, if there is no such missing element in the given input, then print -1.
9. Develop a program to demonstrate the concept of method overloading and operator overloading.
10. Develop a c++ program to demonstrate friend class.
11. Develop a C++ program to demonstrate friend function of another class.
12. Develop a C++ program to demonstrate the use of static variables in a function.
13. Develop a C++ program to demonstrate the concept of this pointer.

UNIT IV **9+9**

Inheritance – Derived class and base class – Derived class constructors –Access specifier – Public and private inheritance – Levels of inheritance –Method overriding – Need for virtual Functions – Late binding - Abstract classes and pure virtual functions –Virtual Destructors and Virtual base classes – Templates – Function templates – Class templates .

Case study:

14. Assume that there is a class Derv that is derived from a base class Base. Write the declarator for a derived-class constructor that takes one argument and passes this argument along to the constructor in the base class
15. Assume a class Derv derived from a base class Base. Both classes contain a member function func() that takes no arguments. Write a statement to go in a member function of Derv that calls func() in the base class.
16. Create a base class input that accepts a range of input number within x and y. Derive two classesfrom class input say class perfect_cube and class perfect_square.With the given range both the derived classes should display the appropriate perfect cubes and perfect squares as output.
17. Create a base class say one that accepts a string input from the user. Derive a class two from class one that accepts another string from user. Derive a class three from class two that checks whether the strings obtained from their ancestors are rotation of each other or not. For example if the given string inputs are S1= “geeks” S2= “ksgee”, then both are rotation of each other.

UNIT V **9+9**

Exceptions – Exception handling mechanisms – Multiple catch blocks - Nested try block – Exception hierarchy –Streams and files – Stream classes - Stream errors – Disk File I/O with streams – File pointers – Error handling in File I/O - Command Line arguments – Standard Template Library (STL) –Algorithms – Sequence containers – Iterators – Function objects.

Case study:

18. Given a scenario in which a vehicle speed should be monitored and if it reaches a certain speed limit, the vehicle should be given a speed alert by providing an appropriate speed control mechanism. Develop a program that throws an exception to a class vehicle that monitors the speed of the vehicle and alerts the driver when he crosses the limit.
19. Write a program that returns the size in bytes of a program entered on the command line: C>filesizeprogram.ext
20. Write a program that applies the sort() algorithm to an array of floating point values entered by the user, and displays the result.

Total: 90 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Gain knowledge about the various programming constructs in C++ to solve real world problems.	Understand	Cognitive	-
CO2	Apply the concepts of object oriented programming in integrated environment to develop interactive applications.	Apply	Cognitive	PO1, PSO1
CO3	Analyze problems and implement simple C++ applications using an object oriented software engineering approach.	Analyze	Cognitive	PO2, PSO1
CO4	Assess the different object programming concepts and adopt the suitable technique to build mobile and enterprise applications.	Evaluate	Cognitive	PO4, PSO1
CO5	Design software application using various object oriented paradigms.	Create	Cognitive	PO3, PO10, PSO1
CO6	Select and apply appropriate modern tools to implement object oriented programming methodologies.	Apply	Cognitive	PO5, PSO1

TEXT BOOKS:

1. Souravsahay, object oriented programming with C++ , 2nd ed, oxford university press, 2006.

REFERENCE BOOKS:

1. E.Balagurusamy, “Object oriented programming with C++”
2. KanetkarYashavant, “LET US C++”, BFB publication, 16th edition.

19UIT404	DATABASE MANAGEMENT SYSTEMS (INTEGRATED COURSE)	L	T	P	C
		3	0	3	4.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
- To enhance knowledge to PL/SQL concepts
- To provide an overview of transaction management & recovery techniques and NoSQL databases.

UNIT I FUNDAMENTALS AND ENTITY-RELATIONSHIP MODEL 10+10

Introductory concepts of DBMS: Introduction and applications of DBMS, Purpose of data base, Data, Independence, Database System architecture-levels, Mappings, Database, users and DBA

Entity-Relationship model: Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features –generalization, specialization, aggregation, reduction to E-R database schema.

Lab Experiments:

1. Implementation of various applications using ER
2. Diagram Concepts.

UNIT II RELATIONAL MODEL AND SQL 10+10

Relational Model: Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, relational algebra queries, tuple relational calculus.

SQL Concepts : Basics of SQL, DDL,DML,DCL, structure –creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions -aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. Transaction control commands –Commit, Rollback, Save point.

Lab Experiments:

1. Implementation of various DDL Commands
2. Implementation of various DML Commands
3. Implementation of various Integrity Constraints.
4. Implementation of Aggregate Functions, Set Operations.
5. Implementation of Sub Queries, Correlated Sub Queries and various Keywords such as group by, having and order by
6. Implementation of Various Joins operations
7. Implementation of Views and its types.
8. Implementation of various TCL Commands.

UNIT III PL/SQL AND RELATIONAL DATABASE DESIGN 10+10

PL/SQL Concepts:
Cursors, Stored Procedures, Stored Function, Database Triggers.

Relational Database Design:
Functional Dependency –definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization –1Nf, 2NF, 3NF, Decomposition using FD-dependency preservation, BCNF, Multi-valued dependency, 4NF, Join dependency and 5NF.

Lab Experiments:

1. Implementation of Various types of Cursors.
2. Implementation of Procedures, Functions and Triggers
3. Design a Database using Normalization Concepts.

UNIT IV TRANSACTION MANAGEMENT 10

Transaction concepts, properties of transactions, serializability of transactions, testing for serializability, System recovery, Two-Phase Commit protocol, Recovery and Atomicity, Log-based recovery, concurrent executions of transactions and related problems, Locking mechanism, solution to concurrency related problems, deadlock, , two-phase locking protocol, Isolation, Intent locking

UNIT V NOSQL 10+10

NoSQL: Overview, and History of NoSQL Databases Definition of the Four Types of NoSQL Database, Comparison of relational databases to new NoSQL stores, NoSQL Key/Value databases using MongoDB, -CRUD operation in MongoDB, Column oriented NoSQL databases using Apache Cassandra, Create, Alter & Drop Key space in Cassandra, Cassandra Query Language (CQL): Insert Into, Update, Delete.

Lab Experiments:

1. Implementation of MongoDB CURD operation.
2. Implementation Create, Alter & Drop Keyspace in Cassandra
3. Implementation of Cassandra Query Language(CQL): Insert Into, Update, Delete

Total: 90 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Explain the basic concepts of DBMS, SQL, Transaction and NoSQL.	Understand	Cognitive	-
CO2	Apply the Conceptual model of a database using ER modeling, construct queries in relational algebra, and also transaction management, NoSQL concepts used to solve the complex engineering problems of various real time applications.	Apply	Cognitive	PO1, PSO1
CO3	Analyze the existing design of a database schema and apply concepts of normalization, Transaction and NoSQL concepts to design and optimal database.	Analyze	Cognitive	PO2
CO4	Design the database structure by applying the concepts of Entity Relationship model, normalization, transaction management & recovery techniques and NoSQL databases and present the same along with the report	Create	Cognitive	PO3, PSO1
CO5	Demonstrate the various real time scenario databases with modern tools	Apply	Cognitive	PO5
CO6	Communicate effectively when working on Mini projects as teams.	Value	Affective	PO10, PO11, PO12

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, Sudharshan.S,"Database System Concepts", Tata McGraw Hill, 5thEd., 2010.
2. Date.C.J, Kannan.A, Swamynathan.S, "An Introduction to Database Systems", Pearson Education, 8th Ed., 2006.
3. PramodJ.Sadalage,Martin Fowler "NoSQL A Brief Guide to the emerging World of Polyglot Persistence Distilled" 2013 Pearson Education, Inc

REFERENCE BOOKS:

1. RamezElmasri, Shamkant B. Navathe," Fundamentals of Database Systems", Pearson Addision Wesley, 4th Ed., 2007.
2. Raghu Ramakrishnan," Database Management Systems", Tata McGraw Hill, 3rd Ed.
3. Singh.S.K," Database Systems Concepts, Design and Applications", Pearson Education, 1st Ed., 2006

19UIT405	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To understand the basic structure and operation of digital computer
- To familiarize with ALU
- To expose the concept of pipe-lining and I/O interfaces.

UNIT I OVERVIEW & INSTRUCTIONS 8

Functional units – Basic operational concepts – Bus structures – Performance and metrics – Instructions and instruction sequencing – Hardware – Software Interface – Instruction set architecture – Addressing modes – RISC – CISC

UNIT II ARITHMETIC OPERATIONS 11

Number Systems – ALU – Addition and subtraction – Multiplication – Division – Floating Point operations

UNIT III PROCESSOR AND CONTROL UNIT 8

Basic MIPS implementation – Building data path – Control Implementation scheme – Pipelining – Pipe-lined data path and control – Handling Data hazards & Control hazards – Exceptions.

UNIT IV PARALLELISM 9

Instruction-level-parallelism – Parallel processing challenges – Flynn's classification – Hardware Multithreading – Multicore processors

UNIT V MEMORY AND I/O SYSTEMS 9

Memory hierarchy – Memory technologies – Cache basics – Measuring and improving cache performance – Virtual memory, TLBs – Input/output system, programmed I/O, DMA and interrupts, I/O processors.

Total: 45 Periods

COURSE OUTCOMES

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

CO. No	Course Outcomes	Taxonomy	Domain	PO & PSO Mapping
CO1	Demonstrate computer architecture concepts related to the design of modern processors, arithmetic operations, memories, and I/O systems.	Understand	Cognitive	-
CO2	Apply the concept of instructions, fixed-point and floating-point arithmetic operations, pipelining, parallelism & memory concepts	Apply	Cognitive	PO1, PSO2
CO3	Analyze different types of communication between processor and peripherals, instructions, and I/O systems.	Analyze	Cognitive	PO2, PSO2
CO4	Evaluate the performance of CPU, memory, and I/O operations, pipelined architectures, parallelism & memory technologies	Evaluate	Cognitive	PO4
CO5	Demonstrate the instructions, arithmetic operations, pipelining concepts, and memory technologies using modern tool	Apply	Cognitive	PO5, PSO1
CO6	Work individual and as a member in arithmetic operations ,pipelining, memory and I/O systems	Value	Affective	PO9
CO7	Communicate effectively with the team in arithmetic operations ,pipelining , memory and I/O systems	Value	Affective	PO10

TEXT BOOKS:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

REFERENCE BOOKS:

1. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.
2. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.
3. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach‖, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

19UIT406	COMPUTER NETWORKS (INTEGRATED COURSE)	L	T	P	C
		3	0	1	4

COURSE DESIGNATION :
PRE-REQUISTIES:
COURSE OBJECTIVES:

- To impart knowledge on the general principles of data communication components
- To impart knowledge on logical addressing and different routing protocols
- To impart knowledge on transmission of data and the quality of service

UNIT I DATA COMMUNICATION COMPONENTS 9+6

Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LAN, Connecting LAN and Virtual LAN, Techniques for Bandwidth Utilization: Multiplexing, Frequency Division, Time Division and Wave Division, Concepts on spread spectrum

Experiment 1: Study on the basics of network terminologies
Experiment 2: Switched LANs (A Set of Local Area Networks Interconnected by Switches)

UNIT II DATA LINK LAYER AND MEDIUM ACCESS SUB LAYER 9+6

Error Detection and Error Correction - Hamming Codes, CRC, Data link Control Protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Multiple Access Protocols, Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA

Experiment 3:Ethernet (A Direct Link Network with Media Access Control)
Experiment 4:Token Ring (A Shared – Media Network with Media Access Control)

UNIT III NETWORK LAYER 9+6

Virtual Circuit and Datagram Networks, Switching, Logical Addressing- IPV4, IPV6,ARP, RARP, BOOTP,ICMP and DHCP, Routing Protocols

Experiment 5: RIP: Routing Information Protocol (A Routing Protocol based on the distance vector algorithm)
Experiment 6: OSPF: Open Shortest Path First (A Routing Protocol based on the distance Link – State Algorithm

UNIT IV TRANSPORT LAYER 9+6

Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP, Congestion Control, Quality of Service : Leaky Bucket and Token Bucket algorithm, Remote Procedure Calls

Experiment 7:TCP - Transmission Control Protocol (A Reliable, Connection – Oriented, Byte-stream Service)
Experiment 8:Queuing Disciplines (Order of Packet Transmission and Dropping)

UNIT V APPLICATION LAYER **9+6**

Domain Name System (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

Experiment 9:Application (Network Application Performance Analysis)

Total: 45+30 Periods

COURSE OUTCOMES:

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

CO. NO	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Explain the data communication components and the various functionalities of different network layers	Understand	Cognitive	-
CO2	Apply the concepts of OSI models, Bandwidth Utilization techniques, Error Detection and Correction Techniques, Routing Algorithms and various network layer protocols	Apply	Cognitive	PO1,PO2, PO5, PSO2
CO3	Analyze the working of multiple access protocols and the application layer protocols	Analyze	Cognitive	PO1, PO2, PO3,PO5, PO6,PO8, PO9, PSO2
CO4	Design a simple network using the network layer protocols and Transport layer protocols	Create	Cognitive	PO1,PO2, PO3,PO4, PO5,PO8, PO9, PSO2
CO5	Find the behavior of the network protocols in various topologies of network by using the network simulator tool	Apply	Cognitive	PO5, PSO2
CO6	Provide the networking environment which may avoid the illegal use of data in the network	Value	Affective	PO8

TEXT BOOKS:

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A System Approach”, Morgan Kauffmann Publishers, 3rd Edition, 2007.
2. Behrouz A. Forouzan, “Data communication and networking”, McGraw-Hill Higher Education Edition, 2010.

REFERENCE BOOKS:

1. James F. Kuross, Keith W. Ross, “Computer Networking – A Top-Down Approach Featuring the internet”, Pearson education, 5th Edition, 2009.
2. Nader F. Mir, “Computer and Communication Networks”, Prentice Hall Publishers, 2nd Edition, 2010.
3. Comer, “Computer Networks and Internets with Internet Applications”, Pearson Education 4th Edition, 2007.
4. Andrew S. Tanenbaum, “Computer Networks”. Prentice Hall of India, 4th Edition, 2003.

19UIT407	SEMINAR	L	T	P	C
		0	0	2	1

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVE:

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: 30 Periods

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)

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

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVE:

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

UNIT I GENDER SENSITIZATION

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

UNIT II CONSTITUTIONAL RIGHTS OF WOMEN IN INDIA

Indian constitution relating to women - 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 - Legal AID cells, Help line, State and National level Commission

UNIT III SOCIAL MEDIA

Emergence of Social Media - Role of Social Media (Face book, Twitter etc) in mobilization of public opinion on women's issues - Victimization of Women through Social media - Empowering role of Social media

Semester V

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UIT501	Object Oriented Programming using Python (Integrated Course) Offered by Infosys - InfyTQ)	3	0	3	4.5	Professional Core
19UIT502	Cyber Security Management	3	0	0	3	Professional Core
19UIT503	Mining and Analysis of Big Data	3	0	0	3	Professional Core
19UIT504	Microprocessor Based System Design	3	0	0	3	Engineering Science
	Professional Elective I	3	0	0	3	Professional Elective
	Open Elective I	3	0	0	3	Open Elective
19UGS531	Reasoning and Aptitude	1	0	0	1	Basic Science
PRACTICAL						
19UIT507	Creative Thinking and Innovation	0	0	2	1	Project Work
19UIT508	Mining and Analysis of Big Data Laboratory	0	0	3	1.5	Professional Core
19UIT509	Microprocessor Based System Design Laboratory	0	0	2	1	Engineering Science
19UGS532	Soft Skills Laboratory	0	0	3	1.5	Humanities and Social Science
	TOTAL	**19**	**0**	**13**	**25.5**	
Total No of Credits - 25.5						

19UIT501	OBJECT ORIENTED PROGRAMMING USING PYTHON (INTEGRATED COURSE) OFFERED BY INFOSYS - INFYTQ	L	T	P	C
		3	0	3	4.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To provide the basic understanding of the fundamentals of python programming
- To demonstrate the object-oriented programming in python
- To provide hands-on experience with the programming concepts.

UNIT I **9+9**

Object oriented analysis and design – Objects and classes – Abstraction – Overview of inheritance and its types – object oriented programming – creating python classes – initializing objects – modules and packages – organizing modules – third party libraries

Case study:

a) Consider a scenario in which two numbers are given as inputs say Variable A and B. The task is to find the closest number to A that is divisible by B. Develop a solution using python class and libraries.

b) Create a python class that possesses a member function that checks whether a given number is a Lucky number or not. A number is said to be a lucky number if all the digits of the number are different.

UNIT II **9+9**

Abstraction -Public and Private data access -Encapsulation - Getter and Setter -Pass by reference - Collection of Objects - List of Objects - Dictionary of objects. Static -Need for static variables - Need for static methods -Static variables and Methods

Case study:

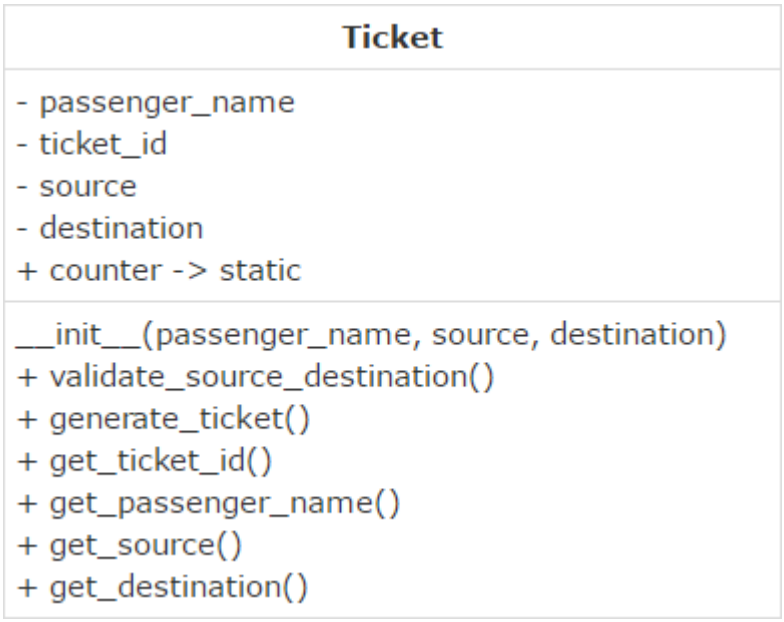
a) In the Athlete class given below, make all the attributes private and add the necessary accessor and mutator methods Represent Maria, the runner and make her run.

```
class Athlete:
    def__init_(self,name,gender):
        self.name=name
        self.gender=gender

    def running(self):
        if(self.gender=="girl"):
            print("150mtr running")
        else:
            print("200mtr running")
```

.

b) Write a Python program to generate tickets for online bus booking, based on the class diagram given below.



UNIT III **9+9**

Class Relationships -Aggregation - Dependency -Association– Basic inheritance – Overriding and super – Inheritance types- Polymorphism

Case study:

a) Develop a python program to check whether an object has the given named attribute and return true if present, else false.

b) Create a class head that consists of member function to accept two input strings. Derive another class tail from class head that contains a method called meta( ) that checks whether the two input strings obtained from the parent class are metastrings of each other or not. Metastrings are the strings which can be made equal by exactly one swap in any of the strings.

UNIT IV **9+9**

Abstract base classes-Abstract methods - Abstract Sub classes.Exception handling - Raising exceptions – Effects of exception – Handling the exception – Exception hierarchy – Creating our own exception

Case study:

a) ABC DTH (Direct to Home) firm wants to calculate monthly rent for its consumers.
A consumer can register for one Base Package. Write a python program to implement the same.
BasePackage class:
validate_base_pack_name():
Validate base pack name. Valid values are "Silver", "Gold" and "Platinum".
If invalid, set attribute, base_pack_name as "Silver" and display "Base package name is incorrect, set to Silver"
calculate_monthly_rent():
Check if subscription period is between 1 and 24 (both inclusive). If so,
Validate base pack name
Identify monthly rent based on base pack. Refer table given.
Consumers are eligible for discount of one month's rent, if subscription period is more than 12

months
Calculate final monthly rent as per the formula given below:
final monthly rent = ((monthly rent * subscription period) – discount amount)/subscription period
Return the calculated final monthly rent
If not, return -1
For testing:
Create objects of BasePackage class
Invoke calculate_monthly_rent() on BasePackage object
Display the details

b) Develop a python program to check the validity of an IP address. An IP address is said to be valid, if the octet values falls within the range of (0-255).

UNIT V **9+9**

Regular expressions – Matching patterns – Matching a selection of characters – Escaping characters – Grouping patterns together – Serializing objects – Customizing pickles – Serializing web objects – Testing object oriented programs – Unit testing and test driven development – py.test automated testing suite mock module

Case study:

i) Develop a python program that matches a word containgin 'g' followed by one or more e's using regex

j) Develop a python program to find all the patterns of "1(0+)1" in a given string using python regex.

Total: 90 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Explain the fundamentals and advanced concepts of object oriented programming in python	Understand	Cognitive	-
CO2	Solve Real world problems through Object Oriented Approach	Apply	Cognitive	PO1, PSO1
CO3	Analyze and identify the appropriate modules, packages and Suitable object oriented approaches in python to reduce the complexity in solving real world problems.	Analysis	Cognitive	PO2, PSO1
CO4	Assess the different object programming concepts and adopt the suitable technique to build real time applications.	Evaluate	Cognitive	PO4, PSO1
CO5	Create a full stack web / enterprise application using python libraries and tools.	Create	Cognitive	PO3, PSO1
CO6	Make use of various software tools and frameworks to build, test and deploy standard python applications	Apply	Cognitive	PO5, PSO1

Textbook:

"Python 3 Object Oriented Programming, Harness the power of python 3 objects", Dusty Phillips

Reference book:

Python 3 Object-Oriented Programming - Third Edition: Build robust and maintainable software with object-oriented design patterns in Python 3.8, 3rd Edition

Introduction to computation and Programming using python, Revised and Expanded Edition", John.V.Guttag

19UIT502	CYBER SECURITY MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To impart knowledge about security in operating systems and networks
- To impart knowledge on the principles of web security and cyberspace
- To impart knowledge about the cyber law, intellectual property rights and cyberwarfare

UNIT I INTRODUCTION TO CYBER SECURITY 9

Introduction -Computer Security - Threats -Harm - Vulnerabilities - Controls - Authentication - Access Control and Cryptography -User Side Web Attacks - Browser Attacks - Email Attacks

UNIT II SECURITY IN OPERATING SYSTEM & NETWORKS 9

Security in Operating Systems -Root kit - Network security attack- Threats to Network Communications - Wireless Network Security-Network Management - Denial of Service - Distributed Denial-of-Service

UNIT III SECURITY COUNTERMEASURES 9

Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Databases - Security Requirements - Reliability and Integrity - Database Disclosure

UNIT IV PRIVACY IN CYBERSPACE 9

Privacy Concepts -Principles and Policies - Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies - The Internet of Things-Data Mining and Big Data

UNIT V MANAGEMENT AND INCIDENTS 9

Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - Electronic Voting - Cyber Warfare- Cyberspace and the Law - Cybercrime - Home Land Security.

Total: 45 Periods

COURSE OUTCOMES:

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

CO. NO	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Explain the concept of data security, vulnerabilities, intrusion detection and prevention system, network management, online privacy, security planning and risk Analysis in cyber security	Understand	Cognitive	-
CO2	Apply the concepts of access control mechanisms, Rootkits, authentication systems, different types of attacks, network behavior analysis, DDOS, Database security, Cyber warfare	Apply	Cognitive	PO1,PSO2
CO3	Analyze the working principles of Access based control systems, Security threats, Wireless security threats Analysis	Analyze	Cognitive	PO1,PO2, PSO2
CO4	Design a surveillance system using key logger to provide cyber security in an organization	Create	Cognitive	PO1,PO4, PO5,PSO2
CO5	Find the Security Incident Response tools to quickly detect the cyber-attacks in the network Modern Tool Usage	Evaluate	Cognitive	PO3,PO5
CO6	Demonstrate a secured environment which depicts the individuality and a leadership quality of an individual person Individual and Teamwork	Value	Affective	PO5, PO10

TEXT BOOKS:

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A System Approach”, Morgan Kauffmann Publishers, 3rd Edition, 2007.
2. Behrouz A. Forouzan, “Data communication and networking”, McGraw-Hill Higher Education Edition, 2010.

REFERENCE BOOKS:

1. James F. Kuross, Keith W. Ross, “Computer Networking – A Top-Down Approach Featuring the internet”, Pearson education, 5th Edition, 2009.
2. Nader F. Mir, “Computer and Communication Networks”, Prentice Hall Publishers, 2nd Edition, 2010.
3. Comer, “Computer Networks and Internets with Internet Applications”, Pearson Education 4th Edition, 2007.
4. Andrew S. Tanenbaum, “Computer Networks”. Prentice Hall of India, 4th Edition, 2003.

19UIT503	MINING AND ANALYSIS OF BIG DATA	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To understand the fundamentals of data mining
- To develop skills for using recent data mining software to solve practical problems
- To impart knowledge about Hadoop Ecosystem

UNIT I CONCEPTS OF DATA WAREHOUSING 8

Basic elements of data warehousing - Online analytical processing – OLAP - OLTP - Introduction to Data Mining (DM) - DM Functionalities - Classification of DM Systems - and Issues in DM – KDD Process - Data Preprocessing - Data cleaning - Data Integration - transformation - Data Reduction - Data Compression - Discretization and Concept Hierarchy

UNIT II ASSOCIATION RULE MINING AND CLASSIFICATION 7

Basic concepts - Association Rule Mining - The Apriori Algorithm - Mining Multilevel Association Rule Mining - Mining Multidimensional Association Rule Mining - Decision Tree - Naive Bayes - K-Nearest Neighbors(KNN)

UNIT III PREDICTION AND CLUSTERING 10

Prediction techniques - Linear regression - Non-linear regression - Clustering techniques - K-Means Clustering - K-Medoids Clustering

UNIT IV INTRODUCTION TO BIG DATA: 10

Introduction to Big Data - Traditional Distributed file system - Big Data Software - Big data Characteristics - Hadoop Input and Output - Hadoop Architecture - Explanation of Hadoop Eco-System - Hadoop Basic commands - Data Integrity in Hadoop - Data Compression and Data Serialization in Hadoop - Introduction to Avro

UNIT V HADOOP ECOSYSTEM/ENVIRONMENT: PIG, HIVE, HBASE 10

Pig Latin Structures – Statements – Functions - User-Defined Function in Pig – Loading - Storing and Sorting Data in Pig – HiveQL - Tables in Hive - Querying Data - User-Defined Function in Hive - Introduction to HBase - HBASE - RDBMS.

Total: 45 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy	Domain	PO Mapping
CO1	Explain the basic concepts of Data warehousing, Data mining & Big data techniques and its tools.	Understand	Cognitive	-
CO2	Apply the knowledge of OLAP models & schema, and implement various DM algorithms in an optimized way to solve the complex engineering problems using various big data tools.	Apply	Cognitive	PO1, PSO1
CO3	Analyze how data analytics and data mining maps to current industry.	Analyze	Cognitive	PO2, PSO1
CO4	Create a model for various real time big data mining applications using the concepts of Schema, DM algorithms and big data tools & techniques to solve the complex engineering problems.	Create	Cognitive	PO3, PSO1
CO5	Apply management principles for function effectively in the project team for project execution.	Apply	Cognitive	PO5, PSO1
CO6	Communicate effectively when working on Mini projects as teams.	Value	Affective	PO9, PO10

TEXT BOOKS:

1. Tom White, “HADOOP: The definitive Guide”, O Reilly 2012.
2. J. Han, M. Kamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann.

REFERENCE BOOKS:

1. M. Kantardzic, “Data mining: Concepts, models, methods and algorithms, John Wiley &Sons Inc.
2. BIG Data and Analytics, Sima Acharya, Subhashini Chhellappan, Willey
3. Ning Tan, Vipin Kumar, Michael Steinbanch Pang, “Introduction to Data Mining”, Pearson Education

19UIT504	MICROPROCESSOR BASED SYSTEM DESIGN	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To impart knowledge about microprocessor or microcontroller
- To impart knowledge on use of allocation schemes and device drivers.
- To impart knowledge about the required hardware and software resources.

UNIT I **9**

Introduction to 8086 – Microprocessor architecture – Addressing modes – Instruction set and assembler directives – Assembly language programming – Modular Programming – Linking and Relocation – Stacks – Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

UNIT II **9**

8086 signals – Basic configurations – System bus timing –System design using 8086 – IO programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.

UNIT III **9**

Memory Interfacing and I/O interfacing – Parallel communication interface – Serial communication interface – D/A and A/D Interface – Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller

UNIT IV **9**

Architecture of 8051 – Special Function Registers(SFRs) – I/O Pins Ports and Circuits – Instruction set – Addressing modes – Assembly language programming.

UNIT V **9**

Programming 8051 Timers – Serial Port Programming – Interrupts Programming – LCD & Keyboard Interfacing – ADC, DAC & Sensor Interfacing – External Memory Interface- Stepper Motor and Waveform generation.

Total: 45 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Explain the basic binary operations using the microprocessor	Understand	Cognitive	-
CO2	Apply knowledge and demonstrate programming proficiency using the various Basic configurations.	Apply	Cognitive	PO1, PSO2
CO3	Compare accepted standards and guidelines to select appropriate Microprocessor and Microcontroller to meet specified performance requirements.	Analyze	Cognitive	PO2, PSO2
CO4	Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices	Create	Cognitive	PO3, PSO2
CO5	Evaluate assembly language programs and download the machine code that will provide solutions real-world control problems.	Evaluate	Cognitive	PO4, PSO2
CO6	Select appropriate machine tool for a cross assembler utility of a microprocessor and microcontroller.	Apply	Cognitive	PO5, PSO2

TEXT BOOKS:

1. Gaonkar , Ramesh S , “Microprocessor Architecture, Programming and Applications with 8085”, Penram International Publishing.
2. Ray A K , Bhurchandi K M , “Advanced Microprocessors and Peripherals”, TMH
3. D. V. Hall, "Microprocessor and Interfacing Programming and Hardware", McGraw Hill, II Edition, 1999
4. B. B. Brey, "The Intel Microprocessors 8086/8088, 80186/ 80188, 80286, 80386, 80486 and Pentium and Pentium Pro Processor", Prentice Hall of India, V Edition, 2006.

19UGS531	REASONING AND APTITUDE	L	T	P	C
		1	0	0	1

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To make the student acquire sound knowledge of the characteristic of quantitative and qualitative aptitude.
- To familiarize the student with various principles involved in solving mathematical problems.
- To develop an understanding of the basic concepts of reasoning skills.

UNIT I **QUANTITATIVE APTITUDE** **8**

Ratio and Proportion - Averages – Percentages – Problems on ages – Profit and Loss – Simple and Compound Interest – Time – Speed -Distance - Time and Work – Permutation and Combination - Alligation or Mixture – Probability – Clocks – Calendars.

UNIT II **VERBAL AND NON VERBAL REASONING** **7**

Analytical Reasoning – Circular and Linear arrangement – Direction problems – Blood relations – Analogy – Odd Man Out – Venn Diagrams - Data Sufficiency – Data interpretation – Syllogism - Coding – Decoding.

Total: 15 Periods

COURSE OUTCOMES:

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

- Select an appropriate technique to solve the quantitative problems within the stipulated time. (Apply)
- Apply Verbal and Non Verbal Reasoning skills to solve the problems based on the logical and analytical reasoning. (Apply)
- Analyse the direction to solve equations involving one are more unknowns. (Analyse)

WEBSITES:

www.m4maths.com, www.indiabix.com, www.fresherworld.com,www.campusgate.co.in, www.indianstudyhub.in, www.tcyonline.com

TEXT BOOKS:

1. Dr. R.S.AGARWAL, “Quantitative Aptitude”, S. Chand Publications, New Delhi, 20th Edition, (2013).
2. ABIJIT GUHA, “Quantitative Aptitude for Competitive Examinations”, Tata McGraw Hill Publication, New Delhi, 4th Edition, (2011).
3. R.V.Praveen, “Quantitative Aptitude and Reasoning”, PHI Learning Pvt. Ltd., Delhi, 2nd Edition, (2013).

REFERENCE BOOKS:

1. ASHISH AGGARWAL, “Quick Arithmetic”, S. Chand Publications, New Delhi, 6th Revised Edition, (2014).
2. Dr.V.A.SATHGURUNATH’S “A Guide for Campus Recruitment”, Sagarikka Publications, Thiruchirapalli, 3rd Edition, (2011).

		L	T	P	C
19UIT507	**CREATIVE THINKING AND INNOVATION**	**0**	**0**	**2**	**1**

PREAMBLE:

Creativity is vital in nearly every industry and occupation. Creativity and innovation are key to generation of new ideas and methods of improving goods and services for customer satisfaction. This course enhances the creative thinking and innovation skills of the students. Being creative helps one to be a better problem solver in all areas of life and work.

COURSE OBJECTIVES:

- To develop next generation Entrepreneurs and Creative Leaders to resolve live challenges.
- To transform innovative ideas into successful businesses
- To use a range of creative thinking tools to develop Out of the Box Ideas

Course Content

Introduction to Creativity and Innovation- Creative Techniques - Problem Identification through Brain Storming - Solution Identification through Creative Techniques - Presentation on the Innovative Idea - Market Analysis - Revenue and Business Model - Preparation of promotional aids - Customer Feedback Analysis.

List of Activities:

Duration	What does the Faculty do?	What do the students do?
Week 1	Explains creativity and innovation	Team Formation (Team Size: 3)
Week 2	Explains the Creative Techniques (Through Video / Presentation)	Discovering Consumer Need through Need Analysis (Customer Segment)
Week 3	Facilitates the brain storming	Problem Identification through brain storming
Week 4	Facilitates problem solving	Identify the solution for the chosen problem through creative techniques
Week 5	Evaluates the presentation	Presentation on the Innovative Idea and Value Proposition

Week 6	Evaluates the presentation	Presentation on the Innovative Idea and Value Proposition
Week 7	Explains about the Market Research / Competitor Analysis, Revenue Model and Business Model	Market Analysis after the explanation
Week 8	Facilitates the students work	Preparation of Innovation Development Plan, Business Development Plan and Financial Plan
Week 9	Facilitates the students work	Preparing product promotional material
Week 10	Facilitates the students work	Improvement through Feedback

Total Hours: 30 Periods

Assessment Pattern

1. Internal Assessment: Presentation on the Innovative Idea
2. End Semester Assessment:
    - Submission of Business Plan
    - Presentation on My Startup Idea (Evaluator : From Industry)

19UIT508	MINING AND ANALYSIS OF BIG DATA LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To develop skills for using recent data mining software and big data tools to solve practical problems in a variety of disciplines

List of Experiments:

1. Design and implement a Data Warehouse.
    - Identify source tables and populate sample data.
    - Create the dimension table and fact table in the data warehouse
    - Design multi-dimensional data models namely Star, Snowflake and Fact Constellation schemas for any one enterprise (ex. Banking, Insurance, Finance, Healthcare, manufacturing, Automobiles, sales etc.)
2. Introduction and installation of WEKA
3. Preparing data sets for WEKA
4. Application of pre-processing methods on data sets using WEKA
5. Application of any two Rule Based classification algorithms on data sets.
6. Application of any two Tree Based classification algorithms on data sets.
7. Application of Naive Bayes classification algorithms on data sets.
8. Installation and use of Hadoop on Windows OS
9. Execute HDFS commands in Hadoop environment.
10. Implementation of a MapReduce Algorithm.
11. Hive installation and run commands on given data.
12. Install HBASE and apply various table queries.

Total: 30 Periods

COURSE OUTCOMES:

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

CO No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Apply the basic knowledge of SQL and various DM algorithms on different data set for various complex engineering problems.	Apply	Cognitive	PO1, PO5, PSO1
CO2	Analyze the performance of how data analytics map with various DM algorithms.	Analyze	Cognitive	PO2, PSO1
CO3	Design various real time big data mining applications using the concepts of Schema, DM algorithms and big data tools & techniques.	Create	Cognitive	PO3, PSO1
CO4	Apply management principles for function effectively in the project team for project execution.	Apply	Cognitive	PO5, PSO1
CO5	Communicate effectively when working on Mini projects as teams.	Value	Affective	PO4, PO10, PO11, PO12, PSO1

19UIT509	MICROPROCESSOR BASED SYSTEM DESIGN LABORATORY	L	T	P	C
		0	0	2	1

COURSE DESIGNATION :
PRE-REQUISTIES:
COURSE OBJECTIVES:

- To demonstrate 8085 assembly language programming.
- To impart knowledge on the latest trends and technologies

List of Experiments:

Assembly Language Programming With 8085:

1. Arithmetic Operations of two 8-bit numbers (Addition, Subtraction, Multiplication & Division).
2. Arranging an array of data (ascending order & descending order).
3. Code Conversion (BCD to HEX, HEX to BCD, HEX to ASCII & ASCII to HEX).
4. Interfacing (8251 (USART), ADC/DAC, 8253 (Timer IC) & 8279 (Keyboard/Display Controller).

Assembly Language Programming With 8051 Microcontroller:

5. Arithmetic Operations of two 8-bit numbers (Addition, Subtraction, Multiplication & Division).
6. Verify Timer/ Counter.
7. Verify Interrupt Handling.
8. Interfacing (Stepper Motor, DC Motor, ADC/DAC, Matrix/Keyboard & LCD)

Assembly Language Programming with ARM Processor:

9. Arithmetic Operations of two 8-bit numbers (Addition, Subtraction, Multiplication & Division).
10. Code Conversion.
11. Programming / interfacing experiments with IDE for 8051/PIC/MSP/Arduino/Raspberry Pi). Relay control, Distance measurement, Temperature measurement , Digital Thermometer Txr-Rxr interface, Alphanumeric LCD display interface.

Software Requirements:

SIM8085
EDSIM51
Embest IDE for ARM 2003

Total: 30 Periods

Course Outcomes:

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

CO No	Course Outcomes	Level	Domain	PO Mapping
CO1	Execute new assembly language programs using instruction sets of 8085	Apply	Cognitive	PO1, PSO2
CO2	Recreate programs using the knowledge of instruction set of 8086 with the help of trainer kit	Create	Cognitive	PO3, PSO2
CO3	Adapt and analyze various interfacing devices with 8085 and 8086 Microprocessors.	Analyze	Cognitive	PO2, PSO2
CO4	Develop assembly and C Programs for 8051 microcontroller for complex related problems	Evaluate	Cognitive	PO4, PSO2
CO5	Demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.	Apply	Cognitive	PO5, PSO2

References:

https://www.sim8085.com
https://www.edsim51.com/simInstructions.html

19UGS532	SOFT SKILLS AND COMMUNICATION LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To develop a requisite knowledge in Communication skills and Soft skills.
- To enhance the students' acumen in honing the skills to meet the Global changes and Industrial needs.

UNIT I **SPEAKING SKILLS** **9**

Conversational Skills - Self Introduction - Group Discussion - Public Speaking - Presentation Skills

UNIT II **WRITING SKILLS** **9**

Letter Writing – Report Writing – Email Writing – Job Application – Resume Preparation

UNIT III **READING AND LISTENING SKILLS** **9**

Reading Comprehension – Enriching Vocabulary – Error Spotting – Listening and Note Taking

UNIT IV **SOFTSKILLS** **9**

Professional Ethics – Interpersonal Skills – Stress Management – Leadership Qualities – Time Management – Conflict Resolution

UNIT V **INTERVIEW SKILLS** **9**

Types of Interviews – Body Language – Professional Grooming – Basic Etiquette

Total: 45 Periods

COURSE OUTCOMES:

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

- Answer the queries precisely after carefully listening to the conversation orspeech.(Affective domain - Responding)
- Communicate orally with fluency and clarity in each contextual situation (Affectivedomain - Responding)
- Debate with clarity of thought and expression to convey their ideas politely to others(Affective domain - Valuing)
- Apply correct usage of English grammar in writing, fluent speaking and comprehending.(Cognitive Domain - Apply)

TEXT BOOKS:

1. Skills for Success, Listening and Speaking – Level 4 by Brooks and Margret – Oxford UniversityPress, Oxford 2011 Edition.
2. Professional Communication by Raman, Meenakshi and Sangeetha Sharma – Oxford UniversityPress, 2014 Edition.
3. Developing Soft Skills by Sherfield, Robert M, R J Montgomery and Patricia G Moody – PearsonEducation Publishers.

Semester VI

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UIT601	Java Programming (Integrated Course)	3	0	3	4.5	Professional Core
19UIT602	Artificial Intelligence	3	0	0	3	Professional Core
	Professional Elective II	3	0	0	3	Professional Elective
	Professional Elective III	3	0	0	3	Professional Elective
	Open Elective II	3	0	0	3	Open Elective
PRACTICAL						
19UIT608	Artificial Intelligence Laboratory	0	0	2	1	Professional Core
19UGS633	Interpersonal Skills Development Laboratory	0	0	3	1.5	Humanities and Social Science
19UIT607	Product Development Project (Common to all Branches)	0	0	8	4	Project Work
MANDATORY						
19UGM632	Indian Constitution and Essence of Indian Traditional Knowledge in Information and Communication Engineering	1	0	0	P/F	Mandatory Course
	TOTAL	**16**	**0**	**13**	**23**	
Total No of Credits - 23						

19UIT601	JAVA PROGRAMMING (INTEGRATED COURSE)	L	T	P	C
		3	0	3	4.5

COURSE DESIGNATION :
PRE-REQUISTIES:
COURSE OBJECTIVES:

- To explain object-oriented designs with Java.
- To demonstrate Java classes with inheritance and dynamic binding.
- To briefly introduce the Collections API and Packages, Exceptions and String Classes.

UNIT I JAVA FUNDAMENTALS 9+9

Introduction to Java - Java Architecture –keywords –Identifiers –Variables – Data types- Operators- Type conversion-Selection control Structure –Iteration Control Structure

Case Study:

a) Implement a program to calculate the product of three positive integer values. However, if one of the integers is 7, consider only the values to the right of 7 for calculation. If 7 is the last integer, then display -1

b) Quadratic equation is an equation with degree 2 in the form of ax2 +bx + c = 0 where a, b and c are the coefficients.

Implement a program to solve a quadratic equation.

Find the discriminant value using the formula given below.

discriminant = b2 - 4ac

If the discriminant is 0, the values of both the roots will be same. Display the value of the root.

If the discriminant is greater than 0, the roots will be unequal real roots. Display the values of both the roots.

If the discriminant is less than 0, there will be no real roots. Display the message "The equation has no real root"

Use the formula given below to find the roots of a quadratic equation.

x = (-b ± discriminant)/2a

UNIT II INTRODUCTION TO OBJECT ORIENTED PROGRAMMING 10+9

Introduction to Object Oriented Programming-Methods – Constructors – This keyword – Memory management- Encapsulation - Abstraction – Access Modifiers – Arrays

Case Study:

a) Implement a class Calculator with the method mentioned below.

Method Description

findAverage()

Calculate the average of three numbers

Return the average rounded off to two decimal digits

Test the functionalities using the provided Tester class.

b) Modify the Restaurant class created before and add the below mentioned constructor.

Method Description

Restaurant(String name, long restaurantContact, String restaurantAddress, float rating)

Initialize the instance variables appropriately with the values passed to the constructor.

Create an object of the Restaurant class and invoke the displayRestaurantDetails() method in the main() method of the Tester class.

UNIT III **ADVANCED JAVA CONCEPTS** **10+9**

Inheritance- Introduction to inheritance- Single Inheritance – Multilevel Inheritance –Polymorphism – Method overloading –Method Overriding –Constructor overloading –Super keyword –Final Keyword- Static modifier –Abstract class – Interfaces

a) The Point class is used for representing a point with two coordinates.
Implement the class Point based on the class diagram and description given below.
Method Description

Point(double xCoordinate , double yCoordinate)

Initialize the instance variables xCoordinate and yCoordinate appropriately with the values passed to the constructor.

calculateDistance()

Calculate and return the distance of the point from the origin (0,0). The distance can be calculated using the formula given below. The distance should be rounded off to 2 decimal digits.

distance=√((x2-x1)2+(y2-y1)2), where x1 and x2 are values of x-coordinates of two points and y1 and y2 are values of y-coordinates of two points

calculateDistance(Point point)

Calculate and return the distance of the point from the 'point' passed to the method. The distance should be rounded off to 2 decimal digits.

Hints
Use Math.sqrt(double d) method to calculate the square root
Use Math.round(double d) method to round off the values
Implement the getter and setter methods appropriately.
Test the functionalities using the provided Tester class.

UNIT IV **COLLECTIONS , PACKAGES AND EXCEPTION HANDLING** **9+9**

Collection Interface – Collection Class – Array List –Linked List – [redacted] – Exception – Try – Throw – Catch –Finally – User defined Exception – throws

Case study:

A bank wants to conduct examinations for recruitment. You need to develop an application for the applicants to submit their details by implementing the classes based on the description given below.
Validator

Method Description

validateName(String name)

Validate that the name is not null or empty. If the name is null or empty, return false, else return true.

validateJobProfile(String jobProfile)

Validate that the jobProfile is either 'Associate' or 'Clerk' or 'Executive' or 'Officer'. If the jobProfile is valid, return true, else return false. Perform case-insensitive comparison.

validateAge(int age)

Validate that the age is between 18 and 30 (both inclusive). If the age is valid, return true, else return false

validate(Applicant applicant)

Validate the details of the applicant by calling the appropriate methods. If any validation fails, throw user defined exceptions based on the below description.
Implement the required user defined exception classes.
Test the functionalities using the main method of the provided Tester class based on the below description.
Create an object of Applicant class and set the values of all the instance variables
Validate the details of the applicant by invoking the validate() method of the Validator class
If all the details are valid, display 'Application submitted successfully!', else, display appropriate error

message

Field violated	User defined exception	Exception message
name	InvalidNameException	Invalid name
jobProfile	InvalidJobProfileException	Invalid job profile
age	InvalidAgeException	Invalid age

UNIT V **USER INTERFACE WITH SWING** **7+9**

String Constructors – Character extraction – String Comparison – Searching strings – String Buffer

Case Study:

Complete the removeWhiteSpaces() method given in the Tester class.

Method Description

removeWhiteSpaces(String str)

Remove all the white spaces from the string passed to the method and return the modified string.

Test the functionalities using the main() method of the Tester class.

Total: 45 + 45 Periods

COURSE OUTCOMES:

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

CO. No	CO statements	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Explain the Object oriented features of Java	Understand	Cognitive	-
CO2	Write Java code for various applications	Apply	Cognitive	PO1, PSO 1
CO3	Analyze the suitable object oriented methodology for solving a complex engineering problem	Analyze	Cognitive	PO2, PSO1
CO4	Design various real time java applications	Create	Cognitive	PO3, PSO1
CO5	Compare the given code with original for logical and syntactical errors	Evaluate	Cognitive	PO4, PSO1
CO6	Use modern tools to implement coding	Apply	Cognitive	PO5, PSO1
CO7	Work in a diversified team	Value	Affective	PO9, PSO1

TEXT BOOKS:

Infosys Offered Course (https://infyspringboard.onwingspan.com/)

REFERENCE BOOKS:

1. Cay S. Horstmann "Core Java Volume I–Fundamentals", Pearson Publishers, Eleventh Edition, 2018

2. Herbert Schildt" The Complete Reference Java ", McGraw Hill , Eleventh Edition , 2018

19UIT602	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :
PRE-REQUISTIES:
COURSE OBJECTIVES:

- To impart knowledge on build intelligent agents for search and games
- To impart knowledge for solve AI problems through programming with python
- To develop learning optimization and inference algorithms for model learning

UNIT I INTRODUCTION **9**

Concept of AI, history, current status, scope, agents, environments, Introduction – Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents – Typical Intelligent Agents - Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.

UNIT II SEARCH ALGORITHMS **9**

Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.

UNIT III PROBABILISTIC REASONING **9**

Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

UNIT IV MARKOV DECISION PROCESS **9**

MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

UNIT V REINFORCEMENT LEARNING **9**

Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning

Total: 45 Periods

COURSE OUTCOMES:

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

CO No	Course Outcomes	Level	Domain	PO Mapping
CO1	Ability to explain concepts of AI, agents, search algorithms and reinforcement learning	Understand	Cognitive	-
CO2	Ability to apply search algorithms, probabilistic reasoning, Markov decision trees and Reinforcement learning	Apply	Cognitive	PO1, PSO1
CO3	Ability to analyze various searching algorithms for a given scenario	Analyze	Cognitive	PO2, PSO1
CO4	Design game playing, Bayesian networks, Hidden Markov model and learning	Create	Cognitive	PO3, PSO1
CO5	Ability to find neighboring location using search algorithm	Apply	Cognitive	PO5, PSO1
CO6	Ability to communicate and present in a team on minimax algorithm	Value	Affective	PO4, PO10, PO11, PSO1, PSO2

TEXT BOOKS:

1. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach”, 3rd Edition, Prentice Hll
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill
3. Trivedi, M.C., “A Classical Approach to Artificial Intelligence”, Khanna Publishing House, Delhi.

REFERENCE BOOKS:

1. Saroj Kaushik,”Artificial Intelligence”, Cengage Learning India, 2011.
2. David Poole and Alan Mackworth, “Artificial Intelligence: Foundations for Computation Agents”, Cambridge University Press 2010.

19UIT608	ARTIFICIAL INTELLIGENCE LABORATORY	L	T	P	C
		0	0	2	1

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To impart knowledge on build intelligent agents for search and games
- To impart knowledge for solve AI problems through programming with python
- To develop learning optimization and inference algorithms for model learning

List of Experiments:

1. Write a program to conduct uninformed and informed search
2. Write a program to conduct game search
3. Write a program to construct a Bayesian network from given data
4. Write a program to infer from the Bayesian network
5. Write a program to run value and policy iteration in a grid world.
6. Write a program to do reinforcement learning in a grid world.
7. Mini Project work.

Total: 30 Periods

COURSE OUTCOMES:

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

CO No	Course Outcomes	Level	Domain	PO Mapping
CO1	Apply the good programming skills to formulate the solution for problems using Uninformed, Informed and game search algorithms	Apply	Cognitive	PO1, PSO1
CO2	Develop programs to analyze various searching algorithms for a given scenario	Analyze	Cognitive	PO2, PSO1
CO3	Design programs to implement the Bayesian networks and reinforcement learning in a grid world.	Create	Cognitive	PO3, PSO1
CO4	Demonstrate and enrich knowledge to select and apply tools to develop product.	Apply	Cognitive	PO5, PSO1
CO5	Formulate valid solutions for problems to assess societal, health, safety, legal and cultural issues by using AI techniques.	Apply	Cognitive	PO6, PSO1
CO6	Demonstrate knowledge of the wider solutions for environment and sustainable development	Apply	Cognitive	PO7, PSO1
CO7	Make use of problem solving approaches to work challenges and make decisions in teams	Value	Affective	PO9, PSO1

CO8	Develop a mini project work in various domains to demonstrate through reports and presentation.	Value	Affective	PO4, PO10, PO11, PSO2
CO9	Recognize the significance of latest changes in the AI technologies to engage lifelong learning.	Apply	Cognitive	PO12

HARDWARE AND SOFTWARE REQUIREMENTS

Hardware requirements:

Computer required: 30 No's

Minimum Requirement: Processor: Processor: Pentium IV, Ram: 1GB, Hard Disk: 80GB

Software requirements:

Python

References:

https://aima.cs.berkeley.edu

https://ai.berkeley,edu/project_overview.html (for Practicals)

19UGS633	INTERPERSONAL SKILLS DEVELOPMENT LABORATORY	L	T	P	C
		0	0	3	1.5

Preamble:

This lab is aimed at strengthening the team and leadership competencies of the students. Some of the key interpersonal skills are communication skill, leadership skill, teamwork skills, problem solving and decision-making skill. People with good interpersonal skills are able to understand others better and communicate better as well. Also this helps to interact with others confidently. The exercises in this lab are designed to enhance the interpersonal skills of the students.

Part - A: Communication and Leadership Projects

I) Speech Projects

1. The Open up Speech (Prepared Speech)
2. Speech Organizing to the Point (Prepared Speech)
3. Table Topics Speech

II) Evaluation Projects

4. Speech Evaluation
5. TAG (Timer, Ah Counter and Grammarian) Evaluation

III) Leadership Roles

6. Speech Master of the Day
7. General Evaluator
8. Table Topics Master

Part - B: Problem-Solving and Decision- Making Project

IV) Quality Circle Project

COURSE OUTCOMES:

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

- Communicate orally with fluency and clarity in a given contextual situation[Responding – Affective Domain]
- Evaluate a speech and offer constructive evaluation of the speech [Evaluating – Cognitive Domain]
- Adapt themselves to work in a group as a member or a leader for efficiently executing the given task [Organizing – Affective Domain]
- Analyze a problem and find appropriate solution.[Analyze-Cognitive Domain]
- Task decision by organizing relevant information and defining alternatives [Organizing-Affective Domain]

19UIT607	PRODUCT DEVELOPMENT PROJECT (COMMON TO ALL BRANCHES)	L	T	P	C
		0	0	8	4

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVE:

- To develop competency with a set of tools and methods for product design, manufacturing and marketing functions in creating a new product

Project Description:

Product development is the process of delivering a new product or improving and existing product for customers. This course helps students to convert an idea into a product. Eight periods per week will be allotted in the time table and this time shall be utilized by the students to receive directions from the guide, for library reading, laboratory work, computer analysis and field work as assigned by the guide. There shall be periodical seminar presentations about the progress made in the project. The progress of the project is evaluated based on a minimum of three reviews.

COURSE OUTCOMES:

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

- Design and develop sustainable innovative solutions for societal issues with consideration for public health, safety and environment. [Create]
- Analyze the market potential and evolve the product strategy[Analyze]
- Apply modern engineering and IT tools, algorithms, techniques to provide valid conclusion following the norms of engineering practice[Apply]
- Test and evaluate the performance of the developed innovative product using appropriate techniques and tools.[Evaluate]
- Organize effectively as a team for executing the project [Organize]
- Write effective reports and make clear presentations[Respond]

19UGM632	INDIAN CONSTITUTION AND ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE IN INFORMATION AND COMMUNICATION ENGINEERING	L	T	P	C
		1	0	0	P/F

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVE:

- The students will be exposed to fundamental rights &duties in Indian Constitution.
- The students will be given knowledge on the components of the parliamentary system to prepare for the process of their career development.
- The student will have knowledge on powers and functions of Local bodies and Indian polityto appear for various competitive exams such as UPSC,TNPSC and RRB…
- The student will know about the functions of judiciary and electoral process followed in the country.

UNIT I INTRODUCTION ON INDIAN CONSTITUTION

Preamble - Salient features of the Constitution of India. Fundamental Rights - its restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) - Fundamental Duties: its Scope and significance in Nation building - Constitution components: schedule,parts and articles of constitution- important Amendments of constitution.

UNIT II PARLIAMENTARY SYSTEM

Parliamentary System–parliamentary system of other countries- Indian parliamentary system-Federal System – LS and RS,Centre-State Relations-Election of member of parliaments-Union Executive - President, Prime Minister, Union Cabinet. State Legislature -State Executives –election of MLA-Governor, Chief Minister, State Cabinet.

UNIT III JUDICIARY AND ELECTION COMMISSION

Supreme Court of India: Structure, Power and Functions of Supreme Court-- Judicial Reviews - Judicial Activism. High Court and Subordinate Courts: Structure, Power and Functions. – Lok adhalats. Elections- Electoral Process - Election Commission of India - Election Laws – EmergencyProvisions - types of Emergencies and its consequences.

UNIT IV LOCAL ADMINISTRATION

Local Administration: Powers and functions of Municipalities and Panchayats System-Panchayat Raj- Co–operativeSocieties and Constitutional and Non-constitutional Bodies.

COURSE OUTCOMES:

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

- Able to apply knowledge of the fundamental rights and duties prescribed by Indian Constitution to prepare for various competitive examinations.
- Able to manage complex societal issues in society with the knowledge of judiciary and local administration.
- Able to interpret the societal, health, safety, legal and cultural issues with understanding of parliamentary system and electoral process through self-learning skills.
- Able to understand the ethical responsibilities of municipalities, panchayats and co-operative societies.
- Able to understand and distinguish the functioning of the parliamentary system followed in various countries.

TEXT BOOKS:

1. Shubham Singles, Charles E. Haries, et al., “Constitution of India and Professional Ethics” by Cengage Learning India Private Limited, 2018.
2. Subhash C. Kashyap,”Our Constitution: An Introduction to India’s Constitution and constitutional Law”, NBT, 2018.
3. Brij Kishore Sharma,“Introduction to the Constitution of India”, PHI Learning Pvt. Ltd.,
4. New Delhi, 2011.
5. M.V.Pylee, “An Introduction to Constitution of India”, Vikas Publishing, 2002.
6. Durga Das Basu, “Introduction to the Constitution on India”,Prentice Hall, 2001.

Semester VII

Course Code	Course Title	L	T	P	C	Type of Course
THEORY						
19UME701	Project Management and Finance	3	0	0	3	Professional Core
19UIT702	Internet of Things Systems and Applications(Integrated Course)	3	0	2	4	Professional Core
	Professional Elective IV	3	0	0	3	Professional Elective
	Professional Elective V	3	0	0	3	Professional Elective
	Open Elective III	3	0	0	3	Open Elective
PRACTICAL						
19UIT707	Summer Internship	0	0	0	1	Project Work
MANDATORY						
19UGM731	Professional Ethics and Human Values	2	0	0	P/F	Mandatory Course
	TOTAL	**20**	**0**	**4**	**21**	
Total No of Credits - 21						

19UME701	PROJECT MANAGEMENT AND FINANCE	L	T	P	C
		3	0	0	3

PRE-REQUISITES:

COURSE OBJECTIVE:

- To impart knowledge to find solutions and approaches for various projects.
- To familiarize the utilization of project within time, resource and financial constraints.

UNIT I **PROJECT MANAGEMENT CONCEPTS** **9**

Concept and characteristics of a project, importance of project management, types of project, project organizational structure, project life cycle, Statement of Work, Work Breakdown Structure.

UNIT II **PROJECT PLANNING** **9**

Project Planning and Scheduling techniques - developing the project network using CPM/PERT, Limitations of CPM/PERT, Precedence Diagramming Method, constructing diagram and computations using precedence diagramming method, PERT/CPM simulation, reducing project duration.

UNIT III **RESOURCES SCHEDULING & CRITICAL CHAIN SCHEDULING** **9**

Resource Scheduling - Resource allocation method, splitting and multitasking, Multi project resources scheduling - Critical Chain Scheduling -Concept of critical chain scheduling - critical chain scheduling method, application of Critical chain scheduling and limitations.

UNIT IV **PROJECT QUALITY MANAGEMENT** **9**

Concept of project quality, responsibility for quality in projects, quality management at different stages of project, tools and techniques, Quality Management Systems, TQM in projects - Project Performance Measurement and Control - Monitor and assess project performance, schedule, and cost. Earned Value Management, performance measurement methods to monitor, evaluate and control planned cost and schedule performance - Project Closure/ Termination - Meaning of closure/ termination, project audit process, termination steps, final closure.

UNIT V **FINANCIAL ACCOUNTING** **9**

Balance sheet and related concepts - Profit & Loss Statement and related concepts - Financial Ratio Analysis - Cash flow analysis - Funds flow analysis – Comparative financial statements. Investments - Average rate of return - Payback Period - Net Present Value - Internal rate of return.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

1. Explain the concept and characteristics of project management. (Understand)
2. Make use of CPM and PERT concepts to construct the project network. (Understand)
3. Utilize Theory of Constraints and Heuristic methods for allocating resources to a project. (Apply)
4. Demonstrate the various tools and techniques at different stages of Quality management. (Understand)
5. Design the balance sheet using trading, profit and loss account. (Apply)

TEXT BOOKS:

1. Prasanna Chandra, "'Fundamentals of Financial Management' ", Tata Mcgraw-Hill Publishing Ltd, 2005.
2. Jack Meredith, Samuel J.Mantel, "Project Management- A Managerial Approach", John Wiley and Sons.

REFERENCE BOOKS:

1. Clifford F Gray, Erik W Larson, "Project Management-The Managerial Process ", Tata Mcgraw-Hill Publishing Co Ltd.
2. John M Nicholas, "Project Management For Business And Technology", Prentice Hall of India Pvt Ltd.
3. Paresh Shah, "Basic Financial Accounting for Management", Oxford University Press, 2007.

19UIT702	INTERNET OF THINGS SYSTEMS AND APPLICATIONS (INTEGRATED COURSE)	L	T	P	C
		3	0	2	4

COURSE DESIGNATION :
PRE-REQUISTIES:
COURSE OBJECTIVES:

- To understand the basic concept IoT
- To impart knowledge about various IoT-related key wireless technologies
- To impart knowledge about various potential IoT platforms

UNIT I INTRODUCTION TO INTERNET OF THINGS (IOT) 9+6

Why the IoT Is Strategically Sound-Envisioning the Internet of Things Era-Illustrating the Device-to-Device/ Machine-to-Machine Integration Concept-The IoT: The Key Application Domains

Case Study

a) Familiarization with the concept of IOT, Arduino / Raspberry Pi and perform necessary software installation in embedded platform.

UNIT II REALIZATION OF IOT ECOSYSTEM USING WIRELESS TECHNOLOGIES 9+6

Introduction, Architecture for IoT Using Mobile Devices, Mobile Technologies for Supporting IoT Ecosystem-Energy Harvesting for Power Conservation in the IoT System-Mobile Application Development Platforms-Mobile Use Cases for IoT-Low Power Wide Area Networking Technologies-Sigfox-Weightless- NWave-Ingenu

Case Study

a) Write a LED Blink program by selecting the Atmael based microcontroller card in the Arduino Integrated Development Environment.

UNIT III INFRASTRUCTURE AND SERVICE DISCOVERY PROTOCOLS FOR THE IOT ECOSYSTEM 9+6

Layered Architecture for IoT,-Protocol Architecture of IoT-Infrastructure Protocol-Device or service Discovery for IOT-Protocols for IoT service Discovery-Prominent IOT Service Discovery products available in the Market

Case Study

a) Study of different operating systems for Raspberry Pi / Beagle board. Understanding the process of Os installation on Raspberry – Pi/ Beagle board

UNIT IV THE INTEGRATION TECHNOLOGIES AND TOOLS FOR IOT ENVIRONMENTS 9+6

The IoT Portion for Smarter Enterprises and Environments- Sensor and Actuator Networks- The IoT Device Integration Concepts, Standards, and Implementations- The Device Integration Protocols and Middleware- The Protocol Landscape for IoT

Case study

a) Study of Connectivity and Configuration of Raspberry-Pi/ Beagle Board circuit with basic peripherals, LEDs, Understanding GPIO and its use in program.

b) Write a program to blink five LEDs using Arrays. All the five LEDS will light after one other

UNIT V PLATFORM ENABLEMENT FOR IOT APPLICATIONS AND ANALYTICS 9+6

IoT Application Enablement Platforms- IoT and M2M Sensor Data Platform by AerCloud- Amazon Web Service IoT Platform -The Axeda IoT Platform -The IoT Data Analytics Platforms - Next-Generation Clouds for IoT Applications and Analytics- Security Management of an IoT Ecosystem.

Case Study

a) Develop a circuit with DHT11 Temperature and Humidity sensor for displaying the values on the Arduino IoT Cloud.

Total: 75 Periods

COURSE OUTCOMES:

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

CO.No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Explain the fundamentals and advanced concepts of Internet of Things prime concerns and challenges associate with device and machine integration.	Understand	Cognitive	-
CO2	Apply the key challenges in the IoT world and solve the problem using Mobile technologies supporting IoT Ecosystem	Apply	Cognitive	PO1, PSO1
CO3	Analyze the integration technologies identify the appropriate protocols for five-layered architecture and define the protocols for infrastructure and service management layers.	Analyze	Cognitive	PO2, PSO1
CO4	Examine the various IoT related connectivity technologies, topologies and tools and their contributions for setting up and sustaining smarter environments.	Evaluate	Cognitive	PO4, PSO1
CO5	Develop proven and potential IoT platforms in terms of applications and analytics, engines, middleware, gateways, communication protocols and so on.	Create	Cognitive	PO3, PSO1
CO6	Build the IoT based smart solution with different IoT based environment tools.	Apply	Cognitive	PO5, PSO1

Text Books:

1. Raj, Pethuru, and Anupama C. Raman. The Internet of Things: Enabling technologies, platforms, and use cases. Auerbach Publications, 2017.
2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, “IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

Reference Books:

1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and
Protocols”, Wiley, 2012 (for Unit 2).
3. Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David
Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011.
5. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O'Reilly Media, 2011.

Websites for Reference:

https://www.arduino.cc/
https://www.ibm.com/smarterplanet/us/en/?ca=v_smarterplanet

Professional Elective

Course Code	Course Title	L	T	P	C
19UIT901	Machine Learning Algorithms and Applications	3	0	0	3
19UIT902	Internet Technology and Web Design (Integrated Course)	2	0	2	3
19UIT903	Insight in to Cloud Computing (Integrated Course)	2	0	2	3
19UIT904	Graphics and Multimedia (Integrated Course)	2	0	2	3
19UIT905	Introduction to Human Computer Interaction	3	0	0	3
19UIT906	Fundamentals of Image Processing (Integrated Course)	2	0	2	3
19UIT907	Mobile Application Development (Integrated Course)	2	0	2	3
19UIT908	Introduction to Embedded Systems	3	0	0	3
19UIT909	Green Information Technology	3	0	0	3
19UIT910	Wireless Communication	3	0	0	3
19UIT911	Building Enterprise Applications	3	0	0	3
19UIT912	Software Testing	3	0	0	3
19UIT913	System Software Internals	3	0	0	3
19UIT914	Enterprise Architecture	3	0	0	3
19UIT915	Free and Open Source Software	3	0	0	3
19UIT916	Web Mining and Social Networks	3	0	0	3
19UIT917	Ethical Hacking and Information Forensics	3	0	0	3
19UIT918	Neuro Fuzzy Systems	3	0	0	3
19UIT919	Information Retrieval Techniques	3	0	0	3
19UIT920	Visualization Technologies	3	0	0	3
19UIT921	Nature and Bio-Inspired Computing	3	0	0	3
19UIT922	Unix Internals	3	0	0	3
19UIT923	Object Oriented System Design	3	0	0	3
19UIT924	Robotics	3	0	0	3

19UIT902	INTERNET TECHNOLOGY AND WEB DESIGN (INTEGRATED COURSE)	L	T	P	C
		2	0	2	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To impart knowledge on basic structure and syntax of HTML 5, CSS, and Bootstrap
- To impart knowledge on basic structure and syntax of JavaScript
- To impart knowledge on basic structure and syntax of PHP

UNIT I HTML5AND CSS **9**

HTML5: Introduction – HTML Syntax – Structure of HTML Documents – Semantic Structure Elements – Media Tags. Cascading Style Sheet: CSS Syntax –Types – Selectors. Responsive Web Design: Introduction – Bootstrap – Grid basics – List – Drop down – Tables – Button –Images – Forms– Input.

UNIT II JAVASCRIPT **9**

JavaScript: Introduction – Syntax- Operators.Control Structures: Selection: if – if-else – switch. Repetition: while – do-while – for – break and continue. Functions: Function Definition – Scope Rules – Recursion. Array: Declaration – Initialization – Growing Arrays – Passing Arrays to Function. Event Handling.

UNIT III PHP **9**

PHP: Server-Side Basics - PHP Basic Syntax - Arrays – Strings-Functions - Forms: Form Basics - Form Controls - Submitting Data - Processing Form data in PHP - Querying a database in PHP: Connecting to a database performing queries.

List of Exercises / Experiments:

1. Design a web page using HTML5 and CSS
2. Design a responsive web page using Bootstrap
3. Design a web page using Control Structures in JavaScript
4. Design a web page using Event Handling in JavaScript
5. Design a web page using form in PHP
6. Design a web page using database in PHP
7. Mini Project (Minimum 4 Sessions or 12 Hours should be allocated)

Lecture: 30, Practical: 30, Total: 60 Periods

COURSE OUTCOMES:

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

COs	Course Outcome Statement	Taxonomy	Domain	PO & PSO Mapping
CO1	Explain the basic structure and syntax of HTML 5, CSS, Bootstrap, JavaScript and PHP	Understand	Cognitive	-
CO2	Apply the knowledge of HTML, CSS and Scripting technologies to develop interactive web applications	Apply	Cognitive	PO1,PSO1
CO3	Analyze front-end web coding languages to add dynamic content, animation and effects to websites	Analysis	Cognitive	PO2,PSO1
CO4	Develop and deploy real time web applications using HTML, CSS and Scripting technologies	Create	Cognitive	PO3,PSO1
CO5	Develop web based application using suitable client side and server side web technologies	Evaluate	Cognitive	PO4,PSO1
CO6	Demonstrate the implementation of web applications using modern web frameworks and tools	Apply	Cognitive	PO5,PSO1

TEXT BOOKS:

1. Paul Deitel, Harvey M.Deitel and Abbey Deitel, “Internet and World Wide Web - How to Program”, 5th Edition, Prentice Hall, 2011.
2. Jeffrey C. Jackson, “Web Technologies: A Computer Science Perspective”, Prentice Hall, 2007
3. www.javatpoint.com

REFERENCE BOOKS:

1. Marty Stepp, Jessica Miller, and Victoria Kirst , “Web Programming”, Step by Step Publication, 2nd edition, 2009
2. Robin Nixon, “Learning PHP, MySQL, JavaScript, CSS & HTML5 - A Step-by-Step Guide to Creating Dynamic Websites”, O'Reilly Media, 3rd Edition , 2014
3. Kogent Learning Solutions Inc., “Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Book”, Dreamtech Press.

HARDWARE/SOFTWARE REQUIREMENTS

Hardware:

- Pentium P4, 2.8 GHz of higher
- 512MB (or higher) RAM
- 40 GB (or higher) HD;
- Windows XP with SP2 (or higher)

Software:

- XAMPP
- Notepad++

19UIT903	INSIGHT IN TO CLOUD COMPUTING (INTEGRATED COURSE)	L	T	P	C
		2	0	2	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- The Oracle Cloud Infrastructure terminology and focuses on the four main ideas of 'Core Infrastructure', 'Database', 'Solutions, Platform and Edge', and 'Governance and Administration'.
- Oracle Academy provides you with free access to the Oracle Cloud Platform which is a comprehensive, standards-based combination of Oracle and open source technologies that enable users to efficiently build, deploy, integrate, secure, and manage enterprise applications. Students must be the age of legal majority in their country of residence to receive a Cloud account

UNIT I GETTING STARTED WITH ORACLE CLOUD INFRASTRUCTURE 10+10

Oracle Cloud Infrastructure Overview - The Global Footprint of the Oracle Cloud Infrastructure - The Components of a Region - Physical Network - Oracle Cloud Infrastructure Services Overview - OCI Differentiation from Other Offerings

List of Experiments:

1. Create a Compartment Group and Policies
2. Create a Dynamic Group

UNIT II VIRTUAL CLOUD NETWORK 10+10

VCI Intro - CIDR - VCN Basics - Security Lists and NSG - LAB Wizard VCN - Lab Manual VCN - LAB NSG - VNICs and IP Addressing in Virtual Cloud Networking - VCN Gateways - Peering Using DRG - VCN Connectivity - Traffic Management - Network Visualizer - Compute Introduction - Autoscaling - VM Migration

List of Experiments:

1. Create a VCN
2. Configure Peering
3. Create a Web server
4. Configure Auto scaling

UNIT III STORAGE SERVICES, DATABASE AND SECURITY 10+10

Block Storage - Object Storage - File Storage - Load Balancer - Data Migration - Database - Security - Observability and Management

List of Experiments:

1. Create, Attach and Resize a Block Volume
2. Create and Manage OCI Object Storage
3. NSG Integration
4. Create an Autonomous Data Warehouse
5. Create a Vault
6. Configure Logging for a Resource

Lecture: 30, Practical: 30, Total: 60 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Explain the concepts of cloud computing and the various deployment and service models of cloud Computing	Understand	Cognitive	-
CO2	Apply the enabling technologies that help in the development of cloud	Apply	Cognitive	PO1, PSO1
CO3	Analyze the impact of design choices for storage, computing and networking options on security, cost, performance and reliability of cloud-based implementations	Analyze	Cognitive	PO2
CO4	Design and develop highly scalable cloud-based applications by creating and configuring virtual machines on the cloud and building private cloud	Create	Cognitive	PO3, PSO1
CO5	Develop and deploy cloud application using popular cloud platforms	Apply	Cognitive	PO5, PSO1
CO6	Work individual and as a member in other cloud platforms	Value	Affective	PO9
CO7	Deploy various cloud platforms to effectively communicate with your team.	Value	Affective	PO10

TEXT BOOKS:

Aparna Nagaraj joseph Garcia, Oracle Cloud Infrastructure Fundamentals, Student Guide, Oracle, D100804GC10, Edition 1.0 | September 2017

REFERENCES:

Learn more from Oracle University at https://education.oracle.com/learn/oracle-cloud-infrastructure

19UIT905	INTRODUCTION TO HUMAN COMPUTER INTERACTION	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To introduce the fundamentals of user interface design
- To provide concepts and guidelines of user interface
- To identify the impact of HCI, formulate and solve user interface issues.

UNIT I INTRODUCTION **8**

Introduction – Importance – Human – Computer interfaces – Characteristics of graphics interface – Direct manipulation graphical system – web user interface – popularity characteristic & principles

UNIT II HUMAN COMPUTER INTERFACE DESIGN PROCESS **10**

User interface design process – obstacles – usability – business functions – requirement analysis – Direct – Indirect methods – basic business functions – Design standards – system timings – structures of menus – functions of menus – contents of menu – formatting – phrasing the many – selecting menu choice – navigating menus – graphical menus.

UNIT III WINDOWS CHARACTERISTICS **9**

Windows: Characteristics – components – presentation styles – types managements organizations – operations – web systems – device – based controls: characteristics – Screen – based controls: operate control – text boxes – selection control – combination control – custom – control – presentation control.

UNIT IV GUIDELINES AND FEEDBACK **9**

Text for web pages – effective feedback – guidance & assistance – internationalization accessibility – Icons – Image – Multimedia – coloring.

UNIT V WINDOWS LAYOUT **9**

Windows layout-test: proto types-kinds of test – retest – Information search – visualization – Hypermedia – www – Software tools.

Total: 45 Periods

COURSE OUTCOMES:

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

- Apply the Knowledge of user Interfaces and User Interface design Principles to design the web pages[Apply]
- Design the system components using User Interfaces with HCI concepts and Principles that meet with realistic constraints. [Apply]
- Apply the appropriate techniques in web systems using window based controls to provide valid

conclusions[Apply]

- Conduct Investigations on different websites with modern IT tools to assess the Societal issues [Analyze]
- Apply the knowledge of different testing techniques to identify the problem in web designs [Apply]

TEXT BOOKS:

1. Wilbent. O. Galitz, “The Essential Guide To User Interface Design”, John Wiley & Sons, 3rd Edition, 2011.

2. Alan Cooper, “The Essential of User Interface Design”, Wiley -Dream Tech Ltd 9th Edition, 2014.

REFERENCE BOOKS:

1. Debbie Stone, Caroline Jarret, Mark Woodroffe, ShaileyMonicha, “User Interface Design and Evaluation (Interactive Technologies)”, Morgan- Kaufmann Publishers, 2005.

2. Ben Sheiderman, “Design the User Interface”, Pearson Education, 3rd Edition, 1998.

3. Ronald M. Baecker, Jonathan Grudin, William A.S. Buxton & Saul Greenberg (Editors Ben Sheiderman), “Readings in Human- Computer Interaction”, Morgan-Kaufmann Publishers, 2nd Edition 1995

4. Ben Shneiderman and Catherine PlaisanSheiderman), “Designing the user Interface : Strategies for Effective Human- Computer Interaction”, Addison-Wesley Publishing C., 5th Edition 1995

19UIT906	FUNDAMENTALS OF IMAGE PROCESSING (INTEGRATED COURSE)	L	T	P	C
		2	0	2	3

COURSE DESIGNATION :
PRE-REQUISTIES:
COURSE OBJECTIVES:

- To impart knowledge on the basic principles and methods of digital image processing
- To develop solutions to general image processing problems
- To impart knowledge on comprehensive background in image filtering

UNIT I INTRODUCTION- DIGITAL IMAGE, REPRESENTATION PROPERTIES AND OPERATIONS 10

Image Representation and Image Processing Paradigm - Elements of digital image processing image model. Sampling and quantization-Relationships between pixels- Connectivity, Distance Measures between pixels - Color image (overview, various color models)-Various image formats bmp, jpeg, tiff, png, gif, etc Topological Properties of Digital Images-Histograms, Entropy, Eigen Values Image Quality Metrics Noise in Images Sources, types. Arithmetic operations - Addition, Subtraction, Multi-plication, Division-Logical operations NOT, OR, AND, XOR-Set operators-Spatial operations Single pixel, neighbourhood, geometric-Contrast Stretching-Intensity slicing-Bit plane slicing Power Law transforms

UNIT II IMAGE ENHANCEMENT AND SEGMENTATION 10

Spatial and Frequency domain-Histogram processing-Spatial filtering-Smoothening spatial filters Sharpening spatial filters- Discrete Fourier Transform-Discrete Cosine Transform-Haar Trans- form - Hough Transform-Frequency filtering-Smoothening frequency filters-Sharpening frequency filters Selective filtering. Segmentation: Detection of Discontinuities-Edge Linking and Boundary detection – Region based segmentation-Morphological processing- erosion and dilation

UNIT III FEATURE EXTRACTION AND IMAGE COMPRESSION 10

Region of interest (ROI) selection - Feature extraction: Histogram based features – Intensity features-Color, Shape features-Contour extraction and representation-Homogenous region extraction and representation-Texture descriptors - Feature Selection: Principal Component Analysis (PCA). Lossless compression versus lossy compression-Measures of the compression efficiency

List of Experiments: **30 hours**

1. Image sampling and quantization
2. Analysis of spatial and intensity resolution of images.
3. Intensity transformation of images.
4. DFT analysis of images
5. Transforms (DCT, Haar)
6. Histogram Processing and Basic Thresholding functions
7. Image Enhancement-Spatial filtering
8. Image Enhancement- Filtering in frequency domain
9. Image segmentation – Edge detection, line detection and point detection.
10. Basic Morphological operations.
11. Region based Segmentation
12. Image compression techniques

13. Image restoration
14. A mini project based on real time applications

Total: 60 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Describe the basics of image processing concepts through mathematical interpretation	Understand	Cognitive	-
CO2	Apply the knowledge of various image transforms, image enhancement, and image segmentation techniques to the solution for Complex Engineering problems	Apply	Cognitive	PO1
CO3	Review Research Literature and analyze complex engineering problems reaching substantiated conclusions using principles of Image Processing.	Analysis	Cognitive	PO2, PSO1
CO4	Design the various basic feature extraction and selection procedures and illustrate the various image compression techniques and their applications.	Evaluate	Cognitive	PO4
CO5	Select and Apply the algorithms used for Images and shows the functions of the image Processing using Open Source tools	Apply	Cognitive	PO5
CO6	Make an effective communication and presentation in a team to demonstrate the concepts of Image Processing	Value	Affective	PO10
CO7	Implement Image processing algorithms for various real-time applications.	Guided Response	Affective	PO11

TEXT BOOKS:

1. Rafael C, Gonzalex& Richard E.Woods, "Digital Image Processing, Pearson Education", 2nd edition, 2006.
2. Schalkoff. R.J, "Digital Image Processing and Computer Vision", 1st Edition, John Wiley and Sons, NY, 2009.

REFERENCE BOOKS:

1. Pratt. W.K, "Digital Image Processing", 3rd Edition John Wiley & sons, 2006.
2. Sonkaet. M, al, "Image Processing, Analysis and Machine Vision", 3rd edition, Thomson Learning, India 2007
3. Kenneth. R,Castleman, "Digital Image Processing", Pearson Education, 1995.
4. Jeyaraman. S, Sakkirajan. S, Veerakumar. T, "Digital Image Processing", McGraw Hill Education, 2009.

WEB REFERENCES:

1. http://ocw.mit.edu/courses/health-sciences-and-technology/hst-582j-biomedical-signal-and-imageprocessing-spring-2007/lecture-notes/
2. http://inst.eecs.berkeley.edu/~ee225b/fa12/lectures/
3. http://www.debugmode.com/imagecmp/

19UIT908	INTRODUCTION TO EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To explain the basic structure of embedded system
- To familiarize with modern hardware / software tools for building prototypes of embedded systems
- To summarize the current statistics of embedded systems

UNIT I INTRODUCTION TO EMBEDDED COMPUTING 9

Complex systems and microprocessors – Embedded system design process – Design example: Model train controller – Instruction sets preliminaries – ARM Processor – CPU: Programming input and output supervisor mode, exceptions and traps – Co-processors – Memory system mechanisms – CPU

UNIT II EMBEDDED COMPUTING PLATFORM DESIGN 9

Components for embedded programs – Models of programs – Assemble, linking and loading – compilation techniques – Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size – Program validation and testing.

UNIT III PROCESS AND OPERATING SYSTEMS 9

Introduction – Multiple tasks and multiple processes – Multirate systems – Preemptive real-time operating systems – Priority based scheduling – Interprocess communication mechanisms – Evaluating Operating system performance-power optimization strategies for processes – Example Real time operating systems.

UNIT IV SYSTEM DESIGN TECHNIQUES AND NETWORKS 9

Design methodologies- Design flows – Requirement Analysis – Specifications – System analysis and architecture design – Quality Assurance techniques – Distributed embedded systems – MPSoCs and shared memory multiprocessors.

UNIT V CASE STUDY 9

Data compressor – Alarm Clock – Audio player – Software modem-Digital still camera – telephone answering machine-Engine control unit – Video accelerator.

Total: 45 Periods

COURSE OUTCOMES:

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

- Describe the architecture and programming of ARM process and outline the concepts of embedded systems
- Explain the basic concepts of real time Operating system design.
- Use the system design techniques to develop software for embedded systems
- Evaluate embedded solutions for solving real world problems

TEXT BOOKS:

1. 1. Marilyn wolf, “Computer as Components – principles of Embedded Computing system Design”, Morgan Kaufmann Publisher, Third edition, 2012.
2. Jonathan W. Valvano, “Embedded Microcomputer system Real Time Interfaceing”, Cengage Learning, Third edition, 2012.

REFERENCE BOOKS:

1. David.E. Simon, “An Embedded Software Primer”. Fifth Impression, 1st Edition, Addison Wesley Professional, 2007.
2. Raymond J.A. Buhr, Donald L. Bailey, “An Introduction to Real –Time systems – from Design to Networking with C/C++”, Prentice hall, 1st Edition, Addison Wesley Professional, 1999.
3. Krihna.C.M, Kang G. shin, “Real-Time Systems”, International Editions, Sixth Edition, McGraw Hill, 1997.
4. Prasad. K.V.K.K, “Embedded Real-Time Systems: Concepts, Design & Programming”. Dream Tech Press, Eight Edition, 2005.

19UIT910	WIRELESS COMMUNICATION	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- Know the characteristic of wireless channel
- Learn the various cellular architectures concepts
- Understand the concepts behind various digital signaling schemes for fading channels
- Be familiar with various multipath mitigation techniques
- Understand the various multiple antenna systems

UNIT I WIRELESS CHANNELS 9

Large scale path loss – path loss models: Free Space and Two-Ray models – link Budget design – Small Scale fading – Parameters of mobile multipath channels – Time dispersion parameters – Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

UNIT II CELLULAR ARCHITECTURE 9

Multiple Access techniques – FDMA, TDMA, CDMA – Capacity calculations – Cellular concept – Frequency reuse – channel assignment – hand off – interference & system capacity – trunking& grade of service – Coverage and capacity improvement.

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS 9

Structure of a wireless communication link, Principles of Offset – QPSK, p/4-DQPSK, minimum Shift Keying, Gaussian Minimum shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV MULTIPATH MITIGATION TECHNIQUES 9

Equalization – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver.

UNIT V MULTIPLE ANTENNA TECHNIQUES 9

MIMO systems – spatial multiplexing – System model – Pre-coding – Beam forming – transmitter diversity, receiver diversity – Channel state information – capacity in fading and non-fading channels.

Total: 45 Periods

COURSE OUTCOMES:

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

- Classify the different fading techniques
- Choose the appropriate multiple access techniques for fading channels
- Compare multipath mitigation techniques and analyze their performance
- Design MIMO systems with transmit/receive diversity

TEXT BOOKS:

1. Rappaport, T.S., “Wireless communications”, Pearson education, 2nd Edition, 2010
2. Andreas. F. Molisch, “Wireless Communications”, John Wiley – India, 2006.

REFERENCE BOOKS:

1. David Tse and PramodViswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.
2. UpenaDalal, “Wireless Communications”, Oxford University Press, 2009.
3. Van nee, R. and Ramji Prasad, “OFDM for wireless multimedia communications”, Artech House, 2000.
4. Jochen Schiller, “Mobile Communication”, Pearson Education Asia Ltd., 2nd, 2008

19UIT911	BUILDING ENTERPRISE APPLICATIONS	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :
PRE-REQUISTIES:

COURSE OBJECTIVES:

- To familiarize functional / nonfunctional requirements, business scenario and document the use case diagrams in the given template
- To demonstrate logical architecture for the given business scenario documented in use case diagrams
- To import data architecture for the given logical architecture

UNIT I INTRODUCTION 8

Introduction to enterprise applications and their type, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise applications.

UNIT II DESIGN PHASE 9

Inception of enterprise applications, enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, nonfunctional requirements, requirements validation, planning and estimation.

UNIT III ARCHITECTURE DESIGN 10

Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture- design, different technical layers, best practices, data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements – Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design.

UNIT IV IMPLEMENTATION METHODOLOGIES 9

Construction readiness of enterprise applications – defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage.

UNIT V VALIDATION 9

Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.

Total: 45 Periods

COURSE OUTCOMES:

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

- Apply the knowledge of software engineering methodologies in the development of an enterprise application.
- Build the requirement analysis for an enterprise with consideration for public health, sate same environment conditions.
- Formulate an architectural design for a new enterprise application importance of application framework and designing component.
- Apply the appropriate technique to perform code review and code analysis.

TEXT BOOKS:

1. Anubhav Pradhan, sathneesha B. Nanjappa, senthil K. Nallasamy, Veerakumar Esakimuthu" Raising Enterprise Applications", John wiley.
2. Brett Mc Laughlin, "Building Java Enterprise Application", O'Reily Media.

REFERENCE BOOKS:

1. Soren Lauesen, "Software Requirements: styles & Techniques", Addison-Wesley Professional, 2002.
2. Brian Berenbach, "Software Systems Requirements Engineering: In Practice", McGraw-Hill/Osborne Media, 2009.
3. Dean LEffingwell, Don Widrig, "Managing software Requirements: A Use Case Approach", Pearson education, 2003.

19UIT912	SOFTWARE TESTING	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To impart basic knowledge on software testing
- To discuss various types of software testing and its techniques
- To describe the strategies for generating system test cases

UNIT I INTRODUCTION 9

Introduction – Goals of Software Testing - Software Testing Definitions - Model for Software Testing - Software Testing as a Process - Software Failure Case Studies - Software Testing Terminology - Software Testing Life Cycle - Software Testing Methodology - Verification and Validation

UNIT II TESTING TECHNIQUES 9

Black-Box Testing Techniques - Boundary Value Analysis, Equivalence Class Testing, State Table-Based Testing - Decision Table-Based Testing – White -Box Testing Techniques - Basis Path Testing, Loop Testing, Data Flow Testing and Mutation Testing - Static Testing

UNIT III LEVELS OF TESTING 9

Unit Validation Testing - Integration Testing – Function Testing - System Testing – Acceptance Testing – Regression Testing - Performance Testing

UNIT IV TEST MANAGEMENT 9

Organization Structures for Testing Teams – Testing Services - Test Planning – Test Management – Test Process – Test Reporting - Testing Metrics for Monitoring and Controlling the Testing Process

UNIT V TEST AUTOMATION 9

Software Test Automation – Skill Needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Test Metrics and Measurements – Project, Progress and Productivity Metrics – J-unit - Case Study - Income Tax Calculator

Total: 45 Periods

COURSE OUTCOMES:

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

COs	Course Outcomes Statement	Taxonomy Level	Domain	PO/PSO Mapping
CO1	Explain the basics of software testing	Understand	Cognitive	-
CO2	Apply the knowledge of software testing principles to detect the defects in real world projects	Apply	Cognitive	PO1
CO3	Analyze the developed software for verification and validation customer requirements	Analysis	Cognitive	PO2,PSO 1
CO4	Design and develop test cases to test the for real world projects	Create	Cognitive	PO3, PSO1
CO5	Evaluate the software with respect to testing techniques, including domain, code, fault, usage and model based for real time applications	Evaluate	Cognitive	PO4, PSO1
CO6	Apply appropriate techniques, resources and modern IT tools including prediction and modeling that develop test cases to exercise a software	Apply	Cognitive	PO5, PSO1
CO7	Work as individuals and as a member of a team to test software projects	Organize	Affective	PO9

TEXT BOOKS:

1. Naresh Chauhan, “Software Testing Principles and Practices”, Third Edition, Oxford University Press, 2012.
2. Srinivasan Desikan, Gopalaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, 2009.

REFERENCE BOOKS:

1. Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black, "Foundations of Software Testing", John Wiley & Sons, 2012
2. Ali Mili, Fairouz Chier, “Software Testing: Concepts and Operations”, Wiley, 2015.
3. Paul C.Jorgesen, "Software Testing : A Craftsma'sApproch" 4th Edition, CRC Press, 2013

19UIT913	SYSTEM SOFTWARE INTERNALS	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To introduce the fundamental concept of machine architecture and compiler principles
- To impart a thorough understanding of Assemblers, Loaders, Linkers.
- To impart familiarity with various phases of compiler

UNIT I ASSEMBLERS 9

System Software and Machine Architecture - The Simplified Instructional Computer(SIC) - Assemblers: Basic Functions - Machine-Dependent and Machine-Independent Assembler Functions - Assembler Design Options - One pass and Multi pass Assemblers - Implementation Example: MASM Assembler

UNIT II LOADERS AND LINKERS 9

Basic loader functions - Design of an absolute Loader - A Simple Bootstrap Loader - Machine dependent loader features - Relocation - Program Linking - Algorithm and Data Structures for Linking Loader - Machine - independent loader features - Automatic Library Search - Loader Options – Loader design options – Linkage Editors – Dynamic Linking – Bootstrap Loaders – Implementation example - MSDOS linker

UNIT III INTRODUCTION TO COMPILERS 9

Basic Compiler Functions - Structure of Compiler - Syntax-Directed Translator - Syntax Definition - Parsing - Lexical Analysis - Role of the lexical Analyzer - Input Buffering - Specification of Tokens - Recognition of Tokens - Lex - Finite Automata - Regular Expressions to Automata - Minimizing DFA.

UNIT IV SYNTAX ANALYSIS – PARSING 8

Role of parsers - CFG - Top down parsing - Bottom-up parsing - LR parsing - LR (0) items - SLR parsing - Canonical LR parsing - LALR parsing - Parse Generators.

UNIT V ICG, CODE GENERATION AND OPTIMIZATION 10

ICG: Three Address Code, Types and Declarations, Translation of Expressions, Type Checking - Code Generation: Issues in the design of a code generator - The target Language - Basic blocks and flow graphs - A simple code generator - Optimization: - The principle sources of optimization - Data flow Analysis

Total: 45 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Explain the fundamentals of object code for SIC machine architecture and identify the relationships among phases of the compiler.	Understand	Cognitive	-
CO2	Apply regular expressions to generate tokens present in the source program and use assembler and compiler to create an executable program from an object module.	Apply	Cognitive	PO1, PSO1
CO3	To understand the various phases of compiler and compare its working with assembler	Analysis	Cognitive	PO2, PSO1
CO4	Generate Intermediate code from a given programming language and to design basic blocks and flow graph from an intermediate code	Create	Cognitive	PO3, PSO1
CO5	Evaluate the problems by constructing parsing table and parse the given input string using top down and bottom up parsing algorithms	Evaluate	Cognitive	PO4, PSO1
CO6	Design and develop programs using LEX and YACC tools	Apply	Cognitive	PO5, 9, 10, 12, PSO1

TEXT BOOKS:

1. Leland L. Beck, “System Software – An Introduction to Systems Programming”, Pearson Education Asia, 3rd Edition, 2000.
2. Alfred V. Aho, Ravi Sethi Jeffrey, D. Ullman, “Compilers - Principles, Techniques, and Tools Pearson Education Asia, 1st Edition, 2007..

REFERENCE BOOKS:

1. John J. Donovan, “Systems Programming”, Tata McGraw-Hill Edition, 2nd Edition 1972.
2. John R. Levine, “Linkers & Loaders”, Morgan Kaufmann Publishers, Harcourt India Pvt. Ltd., 1st Edition 2000.
3. Raghavan “Principles of Complier Design”, Tata Mc-Graw Hill Education, 2010.
4. David Galles, “Modern Complier Design”, Pearson Education Asia, 2007.

19UIT914	ENTERPRISE ARCHITECTURE	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- Describe approaches to enterprise application integration
- Understand the integration middleware
- Evaluate the integration approaches suitable for a given problem

UNIT I INTRODUCTION **8**

Requirements for EAI- Challenges in EAI- Integration with legacy systems- Integration with partners- Heterogeneous environment- Implementation approaches- Web services, messaging, ETL, direct data integration- Middleware requirements- Approaches to integration- services oriented and messaging.

UNIT II INTEGRATION PATTERNS **8**

Introduction to integration patterns- Architecture for application integration- integration patterns-Point to point, broker, message bus, publish/subscribe, challenges in performance, security, reliability-Case studies

UNIT III SERVICE ORIENTED INTEGRATION **10**

Business process integration - Composite applications-services-Web services- Service choreography and orchestration- Business process modeling-BPMN, Business process execution -BPEL-Middleware infrastructure-Case studies.

UNIT IV MESSAGING BASED INTERGRATION **9**

Messaging- Synchronous and asynchronous- Message structure- Message oriented middleware-Reliability mechanisms- Challenges- Messaging infrastructure- Java Messaging Services- Case studies.

UNIT V ENTERPRISE SERVICE BUS **10**

Enterprise service Bus- routing, scalable connectivity, protocol and message transformations, data enrichment, distribution, correlation, monitoring-Deployment configurations- Global ESB, Directly connected, Federated, brokered ESBs- Application server based- Messaging system based-Hardware based ESBs- Support to SOA, Message based and event based integrations- Case studies.

Total: 45 Periods

COURSE OUTCOMES:

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

- Explain different approaches to integration enterprise applications
- Analyze specifications and appropriate integration approaches
- Develop a suitable service oriented integration design for a given problem
- Identify appropriate integration middleware for a case study
- Apply suitable deployment configuration for a given enterprise service bus

TEXT BOOKS:

1. George Mentzas, Andreas Frezen (Eds), " Semantic Enterprise Application Integration for Business Processes: Service- oriented Frameworks", Business Science Reference. USA. 2010.
2. Waseem Roshen, "SOA Based Enterprise Integration", Tata McGrawHill, 1st Edition, 2009.

REFERENCE BOOKS:

1. G. Hohpe and B woolf, "Enterprise Integration patterns: Designing, Building and Deploying Messaging Solution", Addison- Wesley professional, 3 rd Edition, 2003.
2. D Linthicum, " Next Generation Application integration: From Simple information to Web Services", Addison-Wesley, 1st Edition, 2003.
3. Martin fowler, "Patterns of Enterprise Application Architecture", Addison-Wesley, 1st Edition, 2003.
4. Kapil Pant and MatiazJuric, "Business Process Driven SOA using BPMN and BPEL: From Business Process Modeling to Orchestration and Service Oriented Architecture:.Packt Publishing, 1st Edition. 2008.

19UIT916	WEB MINING AND SOCIAL NETWORKS	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :
PRE-REQUISTIES:
COURSE OBJECTIVES:

- To introduce the concept of semantic web and related applications
- To explain the knowledge representation using ontology
- To review human behavior in social web and visualization of social networks

UNIT I INTRODUCTION 10

Introduction to Semantic Web: Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Social Network analysis: Development of Social Network Analysis – Key Concepts and measures in network analysis – Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web based networks – Applications of Social Network Analysis.

UNIT II MODELLING, AGGREGATING AND KNOWLEGE REPRESENATATION 8

Ontology and their role in the Semantic Web: ontology – based knowledge Representation – ontology languages for the Semantic Web: Resource Description Framework – Web Ontology Language –Modeling and aggregating social network data: State-of –the-art in network data representation – Ontological representation of social individuals - Ontological representation of social relationships- Aggregating and reasoning with social network data – Advanced representations.

UNIT III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS 9

Extracting evolution of Web Community from a Series of Web Archive – Detecting communities in social networks – Definition of community – Evaluating communities – Method for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities – Decentralized online social networks- Multi -Relational characterization of dynamic social network communities.

UNIT IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES 9

Understanding and predicting human behavior for social communities – User data management – Interface 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 andreputation – Trust derivation based on trust comparisons – Attack spectrum and counter measures.

UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS 9

Graph theory – Centrality – Clustering – Node – Edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing online social networks Visualizing social networks with matrix-based representations – Matrix and Node - Link Diagrams - Hybrid representations - Applications – Cover networks – Community welfare – Collaboration networks – Co-Citation networks.

Total: 45 Periods

COURSE OUTCOMES:

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

- Explain the core concepts of social network analysis
- Develop semantic web related applications
- Make use of methods for web community detection and mining in social networks
- Analyze human behavior in social web and related communities
- Apply the visualization techniques to social networks

TEXT BOOKS:

1. Peter Mika, "Social Networks and the Semantic Web", Springer, 1st Edition, 2007.
2. BorkoFurht, "Handbook of Social Network Technologies and Applications", Springer, 1st Edition, 2010.

REFERENCE BOOKS:

1. GuandongXu, Yanchun Zhang, "Web Mining and social Networking – Techniques and Applications", Springer, 1st Edition, 2011.
2. Dion Goh, Schebert FOO, "Social information Retrieval systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 1st Edition, 2008.
3. Max Chevalier, Christine Julien, Chantal Soule-Dupuy," Collaborative and Social Information Retrieval and Access: "Techniques for improved user Modelling", IGI Global Snippet, 1st Edition, 2008.
4. John G. Breslin, John G. Breslin, StefanDeckar, "The Social Semantic Web", Springer, 1st Edition, 2011.

19UIT917	ETHICAL HACKING AND INFORMATION FORENSICS	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To learn various hacking techniques and attacks
- To known how to protect information assets against various hacking
- To perform penetration tests into secure networks for evaluation purposes
- To understand information analysis associated with the nature of forensics

UNIT I FUNDAMENTALS OF HACKING **9**

Fundamentals of Computer Fraud – Threat concepts – Framework for predicting inside attacks – Types of Data Stolen – Authenticity and Non-Repudiation – Security Challenges – Effects of Hacking-Hacker and Types of Hacker – Ethical Hacker – Hacktivism – Attacks on Networks and Computers– Malicious Software(Malware) – Protection Against Malware, Intruder – Key Loggers and Back

UNIT II FOOT PRINTING **9**

Web Tools for Foot Printing – Conducting Competitive intelligence – Google Hacking – Scanning, Enumeration – Trojans & Backdoors – Virus & Worms, Proxy & Packet Filtering – Denial of Service – Sniffer – Social Engineering – Shoulder surfing – Dumpster Driving – Piggybacking.

UNIT III NETWORK PROTECTION SYSTEM AND HACKING WEB SERVERS **9**

Network hacking - Routers - Firewall & Honeypots - IDS & IPS, Web Filtering - Vulnerability - Role of Security and Penetration Tester - Penetration Testing Methodology - Session Hijacking - Web Server SQL injection - Cross Site Scripting - Exploit Writing - Buffer Overflow - Web hacking - Password hacking - Email hacking - Incident hacking & Response - Bluetooth hacking - Mobile phones hacking.

UNIT IV INTRODUCTION TO INFORMATION FORENSICS **9**

Computer Forensics Fundamentals – Types of Computer Forensics – Forensics – Technology and Systems - Understanding Computer Investigation – Journaling and it requirements – Standardized logging criteria – journal risk and control matrix – Neural networks – Misuse detection and Novelty detection.

UNIT V FORENSIC ANALYSIS AND TOOLS **9**

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – NetworkForensics – Email Investigations – Cell phone and Mobile Devices Forensics – Multimedia Forensics Internet Forensics

Total: 45 Periods

COURSE OUTCOMES:

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

- Illustrate the fundamental key concepts of hacking and roll of hacker
- Compare various types of hacking methods in different services
- Apply penetration test method for protecting different web services
- Examine computer forensic investigation and journaling technique in misuse detection
- Adapt forensic data hiding technique for different forensic services

TEXT BOOKS:

1. Simpson, Kent Backman, James E.Corley, “Handson Ethical Hacking and Network Defense”, Cengage Learning, USA, 2nd Edition, 2011.
2. Bill Nelson, Amelia Philips, ChristoperSteuart, “Guide to Computer Forensics and Investigations” , Cengage Learning, USA, 5th Edition, 2014.

REFERENCE BOOKS:

1. Kenneth C.Brancik, “Insider Computer Fraud”, Auerbach Publication, USA, 1st Edition, 2008.
2. Ankit Fadia, “Ethical Hacking”, Macmillan Publishing, India, 2nd Edition, 2006.
3. Patrick Engebretson, “The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy”, Syngress Basics Series – Elsevier, USA, 1st Edition, 2011.
4. Andrew Whitakar, Daniel P.Newman, “Penetration Testing and Network Defense”, Cisco Press, USA, 5th Edition, 2006.

19UIT918	NEURO FUZZY SYSTEMS	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To cater the knowledge of Neural Networks and Fuzzy Logic control
- Be exposed to Link Analysis
- Understand Hadoop and Map Reduce
- Learn document text mining techniques

UNIT I INTRODUCTION TO NEURO FUZZY AND SOFT COMPUTING 9

Introduction: From conventional AI to computational intelligence – neural networks – Fuzzy set theory– Evolutionary computation – Neuro Fuzzy and soft computing characteristics

UNIT II NEURAL NETWORKS 9

Adaptive Networks: Architecture – Back propagation for Feed Forward Networks, Supervised Learning Neural Networks: Perceptrons – Radial Basis Function networks- Learning from reinforcement, Unsupervised Learning Neural Networks: Competitive learning networks – Hopfield networks.

UNIT III FUZZY LOGIC 9

Fuzzy Sets: Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems.

UNIT IV NEURO – FUZZY MODELING 9

Adaptive Neuro Fuzzy Inference Systems(ANFIS), Coactive Neuro-Fuzzy Modeling: Introduction-Frame work – Analysis of adaptive learning capability, Classification and Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – Neuro- Fuzzy Control-I

UNIT V ADVANCED APPLICATIONS 9

Adaptive Neuro Fuzzy Inference Systems (ANFIS) Applications, Fuzzy – Filtered Neural Networks: Application 1 – Plasma Spectrum Analysis – Application 2-Hand-Written numeral Recognition, Soft Computing for color recipe prediction: color recipe prediction-single MLP approaches – CANFIS modeling for recipe prediction.

Total: 45 Periods

COURSE OUTCOMES:

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

- Explain the basis of neuro fuzzy systems and soft computing
- Make use of the concept of feed forward network and major task of machine learning technique
- Examine the fuzzy logic operations and rules
- Analyze the various adaptive learning capability
- Apply neuro fuzzy system for an application

TEXT BOOKS:

1. Jyh-Shing Roger Jang, Chuen – Tsai Sun, EijiMIzutani, “Neuro-Fuzzy and soft Computing”, Prenticie – Hall of India, 1st Edition, 2003.
2. James A. Freeman and David M.Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Pearson Edn, 1st Edition, 2003.

REFERENCE BOOKS:

1. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1st Edition, 1995
2. Sivanandam. S.N,Sumathi. S and Deepa. S.N, “Introduction to Fuzzy Logic using MATLAB”, Springer, 1st Edition, 2007
3. Robert Fuller,” Introduction to neuro fuzzy systems”, Physicaverlag publisher, 3rd Edition, 2014
4. Ernest Czogala and jacekLeski, “Fuzzy and neuro-fuzzy intelligent systems”, Physicaverlag publishers, 3rd Edition, 2000.

19UIT919	INFORMATION RETRIEVAL TECHNIQUES	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- Learn the information retrieval models
- Be familiar with Web Search Engine
- Be exposed to Link Analysis
- Understand Hadoop and Map Reduce
- Learn document text mining techniques

UNIT I **INTRODUCTION** **9**

Introduction-History of IR – Issues – Open source Search engine Frameworks – The Impact of the web on IR – The role of artificial intelligence (AI) in IR – IR Versus Web Search – Components of a Search engine – Characterizing the web

UNIT II **INFORMATIOIN RETRIEVAL** **9**

Boolean and vector-space retrieval models – Term Weighting – TF-IDE weighting-cosine similarity – Preprocessing – Inverted indices – efficient processing with sparse vectors – Language Model bas3ed IR – Probabilistic IR – Latent Semantic Indexing – Relevance feedback and query expansion

UNIT III **WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING** **9**

Web search overview, web structure, the user, paid placement, search engine optimization/spam, Web size measurement – search engine optimization/spam – Web Search Architectures – crawling – meta-crawlers – Focused Crawling – Web indexes – Near-duplicate detection – Index Compression-XML retrieval

UNIT IV **WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH** **9**

Link Analysis – hubs and authorities – Page Rank and HITS algorithms – Searching and Ranking – Relevance Scoring and ranking for Web – Similarity – Hadoop & Map Reduce – Evaluation – Personalized search – Collaborative filtering and content-based recommendation of documents and products – handling "invisible" Web – Snippet generation, Summarization, Question Answering, Cross-Lingual Retrieval.

UNIT V **DOCUMENT TEXT MINING** **9**

Information filtering, organization and relevance feedback – Text Mining – Text classification and clustering – Categorization algorithms: naïve Bayes; decision trees; and nearest neighbor – clustering algorithms; agglomerative clustering; k-means; expectation maximization (EM).

Total: 45 Periods

COURSE OUTCOMES:

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

- Make use of Artificial Intelligence techniques in Information Retrieval
- Analyze the various crawling techniques
- Choose an appropriate searching techniques in web services
- Apply document text mining techniques

TEXT BOOKS:

1. C. Manning, P. Raghavan, and H, Schutze, "Introduction to Information Retrieval", Cambridge University Press, 2008.
2. Ricardo Baeza – Yates and BerthierRiberio – Neto, " Modern Information Retrieval: The Concepts and Technology behind Search", ACM Press Books, 2nd Edition 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. OphirFrieder, "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series", Springer, 2nd Edition 2004.
3. Bruce Croft, Donals Metzler and Trevor Strohman, "Search Engines Information Retrieval in Practice", Addison Wesley, 1st Edition 2009.
4. Mark Levene, "An Introduction to Search Engines and web navigation', Wiley, 2nd Edition 2010.

19UIT920	VISUALIZATION TECHNOLOGIES	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To Understand the basic Concepts of Visualization
- To expose the foundations and computer visualization
- To familiarize with multi dimensionally and emerging techniques

UNIT I **VISUALIZATION** **9**

Introduction-Issues-Data Representation – Data Presentation - Interaction

UNIT II **FOUNDATIONS FOR DATA VISUALIZATION** **9**

Visualization stages – Experimental SemIOTics based on Perception Gibson's Affordance theory-A Model of Perceptual Processing – Types of Data

UNIT III **ARCHITECTURAL VIEWS** **9**

Non-Computer Visualization – Computer Visualization Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Non Linear magnification – Comparing Visualization of Information Spaces – Abstraction in computer Graphics – Abstraction in user interfaces

UNIT IV **MULTIDIMENSIONAL VISUALIZATION** **9**

One Dimension – Two Dimensions – Three Dimensions – Multiple Dimensions – Trees – Web Works – Data Mapping Document Visualization – Workspaces

UNIT V **CASE STUDIES** **9**

Small interactive calendars – Selecting one from many – Web browsing through a key hole – Communication analysis – Archival analysis

Total: 45 Periods

COURSE OUTCOMES:

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

- Explain the basic principles of visualization techniques
- Identify the foundations of experimental semIOTics and types of data.
- Analyze the Non-Computer Visualization and Computer Visualization
- Compare the multiple dimensions of visualization
- Analyze the suitable visualization tools for an application

TEXT BOOKS:

1. Colin Ware,"Information Visualization Perception for Design", Margon Kaufmann Publishers, 3rd Edition, 2012.
2. Robert Spence, "Information visualization – Design for Interaction" , Pearson Education, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Staurt.K.Card, Jock D.Mackinlay and Ben Shneiderman, "Readings in Information Visualization using vision to think", Morgan Kaufmann Publishers, 1st Edition, 1999
2. Robert Spence, "Information visualization- An Introduction", Springer International publishing, 3rd Edition, 2007.
3. Mathew o ward, Georges Greinstein, Daneilkeim, "Interactive data visualization- foundation, techniques and applications", CRC Press, 2nd Edition, 2015.
4. Andy Kirk, "Data Visualization a successful design process", Pack Publishers, 1st Edition, 2012.

19UIT921	NATURE AND BIO INSPIRED COMPUTING	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To explain how biological systems exploit natural processes
- To design and implement simple bio-inspired algorithms
- To understand how large numbers of agents can self-organize and adapt

UNIT I **INTRODUCTION** **9**

Natural to Artificial Systems – Behavior of Social Insects: Foraging – Division of Labor – Cemetery Organization and Brood Sorting – Nest Building.

UNIT II **ANT COLONY OPTIMIZATION** **9**

Ant Behavior – Towards Artificial Ants – Ant Colony optimization – Combinatorial Optimization – Meta – heuristic – Local Search – Tabu Search –Global Search.

UNIT III **APPLICATIONS** **9**

Ant Colony Optimization algorithms for NP-hard problems: Routing problems – Assignment problem- Scheduling problem – Subset problem – Machine Learning Problem – ACO for traveling Salesman problem – Extensions of Ant Systems – ACO theoretical considerations.

UNIT IV **SWARM INTELLIGENCE** **9**

Biological foundations of Swarm Intelligence – Swarm Intelligence in Optimization – Particle Swarms for dynamic optimization problems

UNIT V **COMPUTING PARADIGMS** **9**

Biological Inspired computing to Natural Computing – Integration of Evolutionary Computation Components in Ant Colony Optimization – Particle Swarm Optimization based on Socio-cognition.

Total: 45 Periods

COURSE OUTCOMES:

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

- Utilize the knowledge about the Nature and Bio inspired Computing
- Explain the computational complexity of search heuristics using biologically inspired computing
- Discover the state-of-the-art of present technology
- Analyze the swarm intelligence techniques
- Construct the reconfigurable architectures and computational Intelligence techniques.

TEXT BOOKS:

1. Marco Dorigo, Thomas Stutzle, “Ant colony optimization”, MIT press, 2004.
2. Eric Bonabeau, Marco Dorigo, Guy Theraulaz, “Swarm Intelligence: From Nature to Artificial Systems”, Oxford University press, 1st Edition, 2000.

REFERENCE BOOKS:

1. James Kennady, James F. Kennedy, Russell C.Eberhart, “Swarm Intelligence”, Morgan Kaufmann,1st Edition, 2001.
2. Leandro Nunes De castro, “Fundamentals of Nature Computing Basic concepts, Algorithm and Applications”, Chapman & Hall / CRC Computer & Information Science Series, 2006.
3. Leandro N.De Castro. Fernando J.VonZuben. “Recent Developments in Biologically Inspired Computung”, Idea Group Inc.2005.
4. Dario Floreano Claudio Mattiussi, “Bio-inspired Artificial Intelligence: Theories, Methods and Technologies”, MIT Press, 2008.

19UIT922	UNIX INTERNALS	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To get through understanding of the kernel
- To understand the file organization and management
- To have knowledge of various system calls, process architecture, process control, scheduling and memory management

UNIT I GENERAL OVERVIEW OF THE SYSTEM 9

History – System structure – User perspective – Operating system services – Assumptions about hardware. Introduction to the Kernel: Architecture of the Unix operating system – Introduction to System concepts – Kernel data structures – System administration – Summary and Preview.

UNIT II BUFFER CACHE 9

Buffer headers – Structure of the buffer pool – Advantages and disadvantages of the buffer cache. Internal representation of files: Inodes – Structure of a regular file – Directories – Conversion of a path name to an Inode – Super block – Other file types.

UNIT III SYSTEM CALLS FOR FILE SYSTEM 9

Open – Read – Write – File and record locking – Adjusting the position of file I/O – LSEEK – Close – File creation – Creation of special files – Pipes – Dup – Mounting and Unmounting file systems.

UNIT IV THE STRUCTURE OF PROCESSES 9

Process states and transitions – Layout of system memory – The context of a process – Saving the context of a process. Process Control: Process creation – Signals – Process termination – Awaiting process termination – Invoking other programs – The shell – System boot and the INIT process

UNIT V PROCESS SCHEDULING AND MEMORY MANAGEMENT POLICIES 9

Process Scheduling – Memory Management Policies: Swapping – A hybrid system with swapping and demand paging. The I/O Subsystem: Driver Interfaces – Disk drivers – Terminal Drivers.

Total: 45 Periods

COURSE OUTCOMES:

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

- Analyze the basic structure and services of UNIX operating systems
- Demonstrate Buffer and File system of UNIX
- Compare various system calls for file system
- Apply the structure of system processes
- Categorize process scheduling and memory management schemes

TEXT BOOKS:

1. Maurice J.Bach, “The Design of the Unix Operating System,” Prentice Hall of India, 2004.
2. UreshVahalia, “UNIX Internals: The New Frontiers”, Pearson education, 1st Edition, 2008.

REFERENCE BOOKS:

1. Ahmad Shreateh, Julian Wolff, John McDonald, “Digital UNIX Internals and Data Structures”, Elsevier Science & Technology Books, 1997.
2. Myril Clement Shaw; Susan Soltis Shaw, “UNIX internals: A System operation handbook”, Blue Ride remmit, 4th Edition 2010.
3. Steve D. Pate, “UNIX internals: A Practical Approach”, Addison – Wesley, 1996.
4. Curt Schimmel, “UNIX Systems for Modern Architectures”, Addison Wesley Professional Computing Series, 4th Edition, 2003.

19UIT931	OBJECT ORIENTED SYSTEM DESIGN	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To provide the importance of the software design process
- To assess Unified Modeling Language and use the UML design diagrams
- To learn basic OO analysis and design skills through case study
- To learn the appropriate usage of design patterns.

UNIT I INTRODUCTION **9**

An Overview of Object Oriented Systems Development – Object Basics –Object Oriented Systems Development Life Cycle – Unified Modeling Language.

Case study: Develop a Problem statement

UNIT II OBJECT ORIENTED ANALYSIS **9**

Objects Analysis – Use case Diagram – Identifying use cases and relationships – Class Diagram – Identifying Attributes and Methods

Case study: Analyzing Use case Driven Process

UNIT III OBJECT ORIENTED DESIGN **9**

Design process and Design axioms – Interaction Diagram: Sequence and Collaboration Diagram – Activity Diagram – State Chart Diagram – Package Diagram

Case study: Draw the UML Diagrams for Real Time Application

UNIT IV OBJECT ORIENTED METHODOLOGIES **9**

Rumbaugh Methodology – Booch Methodology – Jacobson Methodology – Patterns – Frameworks – Unified Approach

Case Study: Identify the User Interface, Domain Objects, and Technical services (Code generation)

UNIT V OBJECT ORIENTED TESTING **9**

Testing – Issues in OO testing: Units, Implications and Levels – Class Testing – OO Integration Testing – Component and Deployment Diagrams.

Case study: Perform testing for simple applications

Total: 45 Periods

COURSE OUTCOMES:

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

- Apply the knowledge of Object Oriented software development [Apply]
- Analyze Object Oriented concepts by creating use case and class diagrams [Analyze]
- Apply appropriate UML diagrams for Object Oriented design [Apply]
- Identify Object Oriented methodologies to develop OO Design patterns and frameworks [Analyze]
- Apply various testing strategies for real world applications [Apply]

TEXT BOOKS:

1. Ali Bahrami, "Object Oriented System Development", Tata McGraw Hill Education Private Limited, Special Indian Edition, 2008.
2. MichealBlaha, James Rambaugh, "Object – Oriented Modeling and Design with UML", Prentice Hall of India, Second Edition, 2007.

REFERENCE BOOKS

1. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Addison Wesley, Second Edition, 2005.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "Applying UML and Patterns: An Introduction to Object – Oriented Analysis and Design and Iterative Development", Pearson Education, Third Edition, 2008.
3. Erich Gamma, Richard Helm, Raph Johnson, "Design patterns: Elements of Reusable Object – Oriented Software," Addison Wesley, Second Edition, 2005.
4. Mike O'Docherty, Ralph Johnson, Ivar Jacobson, "Object – Oriented Analysis &Design Understanding System Development with UML 2.0", John Wiley & Third Edition, 2008.

19UIT924	ROBOTICS	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :
PRE-REQUISTIES:
COURSE OBJECTIVES:

- To impart knowledge on basic concepts and layouts of robots
- To impart knowledge on robot kinematics and its control methods
- To impart knowledge about the sensors used in robots for better performance.

UNIT I **INTRODUCTION: BRIEF HISTORICAL REVIEW AND MAIN DEFINITIONS** **9**

What Robots Are – Definition of Levels or Kinds of Robots- Manipulators-Structure of Automatic Industrial Systems – Nonindustrial Representatives of the Robot Family- Relationship between the Level of Robot "Intelligence" and the Product. Concepts and Layouts-Processing Layout- How Does One Find the Concept of an Automatic Manufacturing Process? – How to Determine the Productivity of a Manufacturing Process- The Kinematic Layout- Rapid Prototyping.

UNIT II **ROBOT KINEMATICS AND CONTROL** **9**

Dynamic Analysis of Drives- Mechanically Driven Bodies- Electromagnetic Drive- Electric Drives- Hydraulic Drive- Pneumodrive- Brakes- Drive with a Variable Moment of Inertia. Kinematics and Control of Automatic Machines- Position Function- Camshafts- Master Controller, Amplifiers- Dynamic Accuracy- Damping of Harmful Vibrations- Automatic Vibration Damping- Electrically Controlled Vibration Dampers

UNIT III **ROBOT SENSORS AND DEVICES** **9**

Feedback Sensors-Linear and Angular Displacement Sensors- Speed and Flow-Rate Sensors- Force Sensors- Temperature Sensors Item Presence Sensors. Transporting Devices- General Considerations- Linear Transportation- Rotational Transportation- Vibrational Transportation

UNIT IV **FUNCTIONAL SYSTEMS AND MECHANISMS** **9**

General Concepts-Automatic Assembling-Special Means of Assembly-Inspection Systems-Miscellaneous Mechanisms.

UNIT V **ROBOT APPLICATIONS** **9**

Manipulators-Introduction-Dynamics of Manipulators-Kinematics of Manipulators-Grippers-Guides-Mobile and Walking Robots. Robot Applications: Industrial applications of robots, Medical, Household, Entertainment, Space, Underwater, Defense, Disaster management. Applications, Micro and Nanorobots, Future Applications

Total: 45 Periods

COURSE OUTCOMES:

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

CO. No	Course Outcomes	Taxonomy Level	Domain	PO & PSO Mapping
CO1	Outline the historical review and explain the concepts and layouts of processing, Kinematic Layout and rapid Prototype. ,	Understand	Cognitive	-
CO2	Apply the various methods of dynamic analyze, kinematics and its control methods.	Apply	Cognitive	PO1, PSO1
CO3	Analyze the various sensors and transporting devices used in robots for better performance.	Analyze	Cognitive	PO2, PSO1
CO4	Describe the functional systems and mechanisms of automatic assembly, inspection system and its mechanisms.	Evaluate	Cognitive	PO4, PSO1
CO5	Develop kinematics of Manipulators, Grippers, Guides, Mobile and Walking Robots and build various industrial and non-industrial applications of robots.	Create	Cognitive	PO5, PSO1

Text Books:

1. ROBOTICS – Designing the Mechanisms for Automated Machinery -Second Edition,1999, Academic Press
2. Introduction to Robotics Mechanics and Control by John J. Craig, Third Edition

References:

1. Klafter.R.D, Chmielewski.T.A, and Noggin's., "Robot Engineering: An Integrated Approach"', Prentice Hall of India Pvt. Ltd., 1994.
2. Fu.K.S, Gonzalez.R.C&Lee.C.S.G, "Robotics control, sensing, vision and intelligence", Tata- McGraw Hill Pub. Co., 2008
3. Yu. "Industrial Robotics", MIR Publishers Moscow, 1985.

ONE CREDIT COURSES

Course Code	Course Title	L	T	P	C
19UIT861	IT- Infrastructure Management Service	1	0	0	1
19UIT862	Introduction to 3D Animation	0	0	2	1
19UIT863	Web Programming with PHP	0	0	2	1
19UIT864	Android Programming – I	0	0	2	1
19UIT865	Android Programming – II	0	0	2	1
19UIT866	Foundation Program 5.0	1	0	0	1
19UIT867	Logics of Programming	0	0	2	1
19UIT868	Arduino Raspberry Pi	0	0	2	1
19UIT869	No SQL	0	0	2	1
19UIT870	PHP Fundamentals	0	0	2	1
19UIT871	Emotional Intelligence	1	0	0	1
19UIT872	UI Design	0	0	2	1

19UIT861	IT-INFRASTRUCTURE MANAGEMENT SERVICE	L	T	P	C
		1	0	0	1

PRE-REQUISITES:

COURSE OBJECTIVES:

- To familiarize the students with the characteristics of IT IMS
- To learn the Technology drivers of infrastructure evolution

UNIT I **5**

IT IMS-operation and management of an enterprise IT environment. Hardware, Software, network resource, servers, data centers and required for the existence. This discipline of managing & maintaining hardware, network systems and applications and is commonly referred as infrastructure management services (IMS).

UNIT II **5**

Information Technology has become critical in every business, right from banking, finance, insurance, automobile, aviation, media, and entertainment and so on. Usage of computers, hardware devices and network is rapidly growing. For businesses, it is becoming very vital to keep the hardware, networks and applications functionally up to date and running in 24 X 7 mode.

UNIT III **5**

Today it is one of the most rapidly growing disciplines in information technology arena and it is being seen as the third wave in Indian IT industry. Introduction evolution of IT infrastructure. IT IMS market size. Recent trends in IT infrastructure management. Infrastructure components. Technology drivers of infrastructure evolution. IT IMS-industries expectation from an engineer. Employability skills essential for an engineer to be part of the domain – IMS. IT IMS Indian scenario job role & opportunities in IT IMS industry.

TOTAL: 15PERIODS

COURSE OUTCOMES:

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

- Explain the Infrastructure management service
- Analyze the need of Hardware and Network in a business
- Apply the employability skills essential for an engineer to be part of the domain - IMS

19UIT862	INTRODUCTION TO 3D ANIMATION	L	T	P	C
		0	0	2	1

UNIT I BASIC 3D MODELING TECHNIQUES 4

Model with Primitives Reference Coordinate Systems and, Applying Transforms and Sub-Object Mode, Cloning and Grouping and Poly Modeling, Creating Shapes with Splines, Editing Meshes and Creating Complex Objects

UNIT II ENHANCING MODELS WITH MATERIALS 4

Understanding Bitmap Texture Maps, Adding Materials to Objects & Material Libraries, Editing Materials & Map scalar Modifiers, Modeling with displacement Maps

UNIT III Introduction to Animation 3

Copying Key frames, Path Animation and Trax Editor, Anticipation and Momentum in Knife Throwing, Setting Up the Scene and Beginning the Soldier Model

UNIT IV CHARACTER ANIMATION 4

Character Modelling and Texturing, Skeleton and Iks and Keys, Export the character and its animations, Load the Character in Virtools, Material & texture tuning, Merge animations & add behaviors.

TOTAL: 15PERIODS

COURSE OUTCOMES:

After successful completion of the course the student will able to

- Discuss the principles of narrative and timing in relation to 3D animation
- Create texture, illuminate and render images and backgrounds in the production of simple 3D animation sequences, using 3D animation software.
- Present and critique 3D animation concepts.

TEXT BOOKS:

1. Jeffrey M. Harper, “Mastering Autodesk 3ds Max 2013”, John wiley, 2013
2. Randi L. Derakshani, “DariushDerakhshani Autodesk® 3ds Max”, 2014.

19UIT863	WEB PROGRAMMING WITH PHP	L	T	P	C
		0	0	2	1

UNIT I HISTORY OF PHP & PHP VARIABLE 2

Client side scripting, Server side scripting, Characteristics of PHP, Syntax of PHP and Hello World program, Data types and variables, PHP Server variables, PHP Constants, Arrays & String

UNIT II OPERATORS 2

Arithmetic operators, Comparison operators, Logical operators, string operators, Array operators

UNIT III BRANCHING & LOOPING 2

If-Else, Nested If – Else, For, While, Do – While, Switch

UNIT IV PHP-FUNCTIONS 2

In build Function, User Defined Function, and Calendar Function

UNIT V ADVANCE PHP 7

PHP Session, PHP Cookies, File Upload, File Handlings, PHP Form Handling, Do-Get (), Do-Post(),PHP – Database Connectivity

TOTAL: 15PERIODS

COURSE OUTCOMES:

After successful completion of the course the student will able to

- Develop functional PHP script
- Understand the use of PHP with HTML
- Understand the ability to post and publish a PHP website.
- Develop Web Applications

TEXT BOOKS:

1. Vikramvaswani, “PHP – A Beginners Guide”, McGraw – Hill,2009
2. Steven Holzner, “PHP: The Complete Reference”, Tata McGraw Hill, 2007.

19UIT864	ANDROID PROGRAMMING –I	L	T	P	C
		0	0	2	1

PRE-REQUISITES:

COURSE OBJECTIVES:

- To understand the essentials of mobile apps development
- To understand the fundamental concept of designing and developing

UNIT I INTRODUCTION TO ANDROID 4

Introduction to android (features, applications), Environment setup, Architecture, Applications Component, Hello world example

UNIT II ACTIVITY CREATION 4

Activities, Services, Media player, Broadcast receivers

UNIT III COMPONENT FUNCTIONALITIES 3

Content providers, Intents & filters, Event handling

UNIT IV LAYOUTS 4

UI layouts, Relative, linear, table, Grid view, UI controls, Notifications

TOTAL: 15 PERIODS

COURSE OUTCOMES:

After successful completion of the course the student will able to

- Understand the existing state of mobile app development via researching existing apps, and formulating new ideas.
- Display proficiency in coding on a mobile programming platform.
- Understand the limitations and features of developing for mobile devices.

REFERENCE LINKS:

1. https://www.bignerdranch.com/we-write/android-programming
2. http://www.technotopia.com/index.php/Android Studio Development Essentials

19UIT865	ANDROID PROGRAMMING –II	L	T	P	C
		0	0	2	1

PRE-REQUISITES:

COURSE OBJECTIVES:

- To understand the fundamental concept of designing and developing
- To learn the various testing process.

UNIT I CUSTOM COMPONENTS **4**

Sending Email, Sending SMS, Phone Calls, Audio Manager

UNIT II SENSORS **4**

Network Connection, Image Switcher, Image view, Gestures

UNIT III INTERNAL STORAGE **3**

Sqlite Database creation, Sqlite Database Access and Modification File Storage

UNIT IV PHP/SQL **4**

Mysql integration with android, server side integration, push notifications, screen cast.

TOTAL: 15 PERIODS

COURSE OUTCOMES:

After successful completion of the course the student will able to

- Use the development tools in the Android development environment
- Display proficiency in coding on a mobile programming platform.
- Create a complete Mobile app with a significant programming component, involving the sensors and hardware features of the phone.

REFERENCE LINKS:

1. https://www.bignerdranch.com/we-write/android-programming
2. http://www.technotopia.com/index.php/Android Studio Development Essentials

19UIT866	FOUNDATION PROGRAM 5.0	L	T	P	C
		1	0	0	1

PRE-REQUISITES:

COURSE OBJECTIVES:

- To learn the python fundamentals
- To learn the database fundamentals
- To learn python database integration

UNIT I PROGRAMMING FUNDAMENTALS **5**

Introduction to Programming – Algorithm, Flow Chart and Pseudo Code – Python Fundamentals – Control Structure – Data Structures - Functions – File Handling – Exception Handling – Modules and package – More on Data Structures

UNIT II DATABASE FUNDAMENTALS **5**

Data and Need for DBMS - Relational Model and Keys - Database Development Life Cycle- Data Requirements - Logical Database Design - Physical Database Design - Normalization - Implementation with SQL - SQL - Built-in Functions - SQL - Group By and Having Clauses

UNIT III PHYTHON DATABASE INTEGRATION **5**

Python Database Integration – Pre-requisites and Installation – SELECT Operation – CREATE and INSERT Operation – UPDATE Operation – DELETE Operation – Exception Handling

TOTAL:15PERIODS

COURSE OUTCOMES:

After Successful completion of the course the student will able to

- Illustrate basic concepts of python programming
- Illustrate basic concepts of Database Fundamental
- Apply database integration with Python

COURSE MATERIAL

SELF LERNING MODE LINK: https://campusconnect.infosys.com/Content/FPContent.aspx

19UIT867	LOGICS OF PROGRAMMING	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To provide exposure to problem-solving through programming
- It Involves a lab component which is designed to give the student hands-on experience with the concepts.

List of Experiments:

1. Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs. 12.00 per hour for every hour worked above 40 hours. Assume that employees do not work for fractional part of an hour.
2. At a football match, tickets are sold in three categories: reserved, stands, and grounds. For each of these categories, you are given the ticket price and the number of tickets sold. Write a program to prompt for these values and print the amount of money collected from each category of tickets. Also print the total number of tickets sold and the total amount of money collected
3. Ten numbers are entered from the keyboard into an array. The number to be searched is entered through the keyboard by the user. Write a program to find if the number to be searched is present in the array and if it is present, display the number of times it appears in the array.
4. Write a program which to find the grace marks for a student using switch. The user should enter the class obtained by the student and the number of subjects he has failed in.
    1. If the student gets first class and the number of subjects he failed is greater than 3, then he does not get any grace. If the number of subjects he failed is less than or equal to 3 then the grace is of 5 marks per subject.
    2. If the student gets second class and the number of subjects he failed is greater than 2, then he does not get any grace. If the number of subjects he failed is less than or equal to 2 then the grace is of 4 marks per subject.
    3. If the student gets third class and the number of subjects he failed is greater than 1, then he does not get any grace. If the number of subjects he failed is equal to 1 then the grace is of 5 marks per subject
5. The user inputs a number and then enters a series of numbers from 1 to that number. Your program should determine which number (or numbers) is missing or duplicated in the series, if any. For example, if the user entered 5 as the initial number and then entered the following sequences, the results should be as shown.

```
Input Sequence      Output
----------------    ---------------
1 2 3 4 5           Nothing bad
```

However, if 7 were the highest number, the user would see the results on the right for the following number entries:

```
Input Sequence          Output
----------------        ---------------
1 3 2 4 5               Missing 6
                        Missing 7
```

If 10 were the highest number and the user entered the numbers shown on the left, note the list of missing and duplicate numbers:

```
Input Sequence          Output
----------------------  ---------------
1 2 4 7 4 4 5 10 8 2 6  Duplicate 2 (2 times)
                        Missing 3
                        Duplicate 4 (3 times)
                        Missing 9
```

The program should check the highest number that the user inputs to ensure that it does not exceed the size of any array you might be using for storage.

6. Write a program to calculate the volume of the following shapes: Cube, Cuboid, Sphere,Cylinder and Cone. Ask the user which one s/he wants to calculate, and take the appropriaterequired inputs. Then print the result. The input should be taken in the main function andcalculations for every solid should be done in a separate function by passing appropriatearguments.

Example:

If the user chooses the option for cube, only one input is required i.e., the side. The volume is then calculated and printed.

If the user chooses the option for cuboid, only three inputs are required i.e., length, breadth and height. The volume is then calculated and printed

7. An Electricity board charges the following rates for use of electricity.

For the First 200 units : Rs 1 per unit

For the next 100 units : Rs 1.5 per unit

Beyond 300 units : Rs 2 Per unit.

Write a Program to read no of unit consumed and print out total charge amount.

8. Create a program that will compute the net salary based on the number of hours worked and their respective rate. If there is overtime, net salary is computed as salary plus overtime pay. Overtime pay is computed based on the number of hours' overtime and their respective overtime rate.

9. Write a guessing game where the user has to guess a secret number. After every guess the program tells the user whether their number was too large or too small. At the end the number of tries needed should be printed. It counts only as one try if they input the same number multiple times consecutively.

10.Write a program that takes the duration of a year (in fractional days) for an imaginary planet as an input and produces a leap-year rule that minimizes the difference to the planet's solar year.

TOTAL:30 PERIODS

COURSE OUTCOMES:

After Successful completion of the course the student will able to

- To apply good programming principles to the design and implementation
- To design, implement, debug and test programs using the fundamental elements

TEXT BOOKS:

1. Programming In Ansi C -by E. Balagurusamy
2. Let us C – by Yashavant P. Kanetkar

19UIT868	ARDUINO RASPBERRY PI	L	T	P	C
		0	0	2	1

PRE-REQUISITES:

COURSE OBJECTIVES:

- To Understand the fundamental concepts in Arduino and Raspberry Pi
- To Learn the Arduino programming language and IDE
- To Learn the Raspberry Pi programming language and IDE

List of Experiments:

1. Study and Install IDE of Arduino and it types
2. Arduino IDE for Blink LED
3. RGB LED
4. Temperature sensor
5. RFID (Radio-frequency identification)
6. MQTT (Message Queuing Telemetry Transport) protocol
7. Connecting Arduino to cloud
8. Study and Configure Raspberry Pi
9. WAP for LED blink
10. Dimming Light Using PWM
11. Connecting Arduino to Raspberry Pi
12. Connecting GPS to Raspberry Pi

Project:

Smart Connected Home – An Arduino (Or) Raspberry pi to connect your house to social media tools and give intelligence.

TOTAL:30 PERIODS

COURSE OUTCOMES:

After Successful completion of the course the student will able to

- Design and develop different control system with Arduino board
- Make use of the concepts in Raspberry Pi and develop different control system

HARDWARE / SOFTWARE REQUIREMENTS:

PC
Breadboard
Arduino Uno R3
RGB LED
LED
330Ω Resistor
Jumper Wires
Starter Kit for Raspberry Pi
Communication Shield
RFID 13.56 MHz / NFC Module for Arduino and Raspberry Pi

19UIT869	NO SQL	L	T	P	C
		0	0	2	1

PRE-REQUISITES:

COURSE OBJECTIVES:

- To acquire knowledge on variety of NoSQL databases
- To attain inquisitive attitude towards research topics in NoSQL databases

List of Experiments:

1. NoSQL : NoSQL Features, Types, Advantages
2. Mongo DB: Introduction, Architecture and Features
3. Download & Install Mongo DB on Windows
4. Install Mongo DB in Cloud: AWS, Google, Azure
5. Create Database & Collection in Mongo DB
6. CRUD Operations in Mongo DB
7. PHP Mongo DB Connectivity
8. Cassandra Features, Applications, Architecture and Data
9. Download & Install Cassandra
10. Cassandra CRUD Operations and Shell Commands
11. Cassandra Data Definition and Data Manipulation Commands
12. Cassandra CQL Clauses, Data types, User Data Types and Collection Data Types
13. Comparison of Cassandra with Mongo DB
14. Create a Simple Cassandra Cluster With 3 Nodes

TOTAL:30 PERIODS

COURSE OUTCOMES:

After Successful completion of the course the student will able to

- Analyze the NoSQL databases with each other and Relational Database Systems
- Demonstrate the knowledge of Document based Databases (Mongo DB) and Column based Databases (Cassandra)

19UIT870	PHP FUNDAMENTALS	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- Understand the PHP fundamentals and functions
- Design web pages using PHP

UNIT I INTRODUCTION TO PHP 5

Evaluation of PHP – Basic Syntax – Defining variable and constant – Php Datatype – Operator and Expression – Case Study

UNIT II DECISIONS AND LOOPS, FUNCTIONS, STRINGS AND ARRAYS 5

Decisions – Repetitive task with looping – Defining Functions – Call by value and Call by reference – Creating and accessing string – Formatting string – Accessing array element – Looping with Index based array – Case Study

UNIT III FILE HANDLING, FORMS AND DATABASE CONNECTIVITY 5

Working with Files and directories – Php Forms – Connection with Mysql Database – Performing basic database operation - Case Study

TOTAL: 15PERIODS

COURSE OUTCOMES:

After successful completion of the course the student will able to

- Create PHP Programs using decisions, loops, functions, strings and arrays.
- Develop simple web application using file handling, forms and Database connectivity using Mysql

TEXT BOOKS:

1. Vikramvaswani, “PHP – A Beginners Guide”, McGraw – Hill,2009
2. Steven Holzner, “PHP: The Complete Reference”, Tata McGraw Hill, 2007.

19UIT871	EMOTIONAL INTELLIGENCE	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To introduce emotional intelligence concepts and frameworks
- To learn the core skills required to practice emotional intelligence
- To implement these concepts and techniques in the workplace

UNIT I INTRODUCTION TO EMOTIONAL INTELLIGENCE 5

Concept of Emotional Intelligence - Contributors to Emotional Intelligence - Science of Emotional Intelligence - EQ and IQ - Scope of Emotional Intelligence.

UNIT II COMPONENTS OF EMOTIONAL INTELLIGENCE 5

Self-awareness - Self-regulation – Motivation – Empathy - Social skills. Emotional Intelligence Competencies - Elements of Emotional Intelligence - Models of Emotional Intelligence: The Ability-based Model - The Trait Model of Emotional Intelligence - Mixed Models of Emotional Intelligence.

UNIT III EMOTIONAL INTELLIGENCE AT WORK PLACE 5

Importance of Emotional Intelligence at Work place - Emotionally Intelligent Leaders - Case Studies Measuring Emotional Intelligence: Emotionally Intelligence Tests - Research on Emotional Intelligence - Developing Emotional Intelligence.

TOTAL: 15PERIODS

COURSE OUTCOMES:

After successful completion of the course the student will able to

- Analyze various principles of emotional intelligence in different contexts of life.
- Create an emotional intelligence and optimum potentials for better performance

TEXT BOOKS:

1. Joshua Lombard ,"Emotional Intelligence: A Mastery Guide to Controlling Your Emotions and Social Skills for a Better Life and Boosting Your EQ",2020
2. Liz Wilson, Stephen Neale & Lisa Spencer-Arnell (2020). Emotional Intelligence Coaching. Kogan Page India Private Limited

Open Elective Courses

Course Code	Course Title	L	T	P	C
19UIT971	PC Troubleshooting	3	0	0	3
19UIT972	Social Networks	3	0	0	3
19UIT973	Cyber Forensics Technology	3	0	0	3
19UIT974	Animation Technology	3	0	0	3
19UIT975	Computer architecture	3	0	0	3
19UIT976	Fundamentals of Database Management Systems	2	0	2	3
19UIT977	Learning IT Essentials by Doing	3	0	0	3
19UIT978	Website Designing	3	0	0	3

19UIT971	PC TROUBLESHOOTING	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- Identify major components including motherboards, memory, drives, peripheral devices
- Introduce troubleshooting and maintaining the computer system
- Provide opportunities to develop basic techniques with respect the hardware of a computer system

UNIT I INTRODUCTION 9

Introduction – Computer Organization – Number Systems and Codes – Memory – ALU – CU Instruction prefect – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II PERIPHERAL DEVICES 9

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax Modem – CD Rom Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC HARDWARE OVERVIEW 9

Introduction – Hardware BIOS DOS Interaction – The PC family – PC Hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC-HDC

UNIT IV INSTALLATION AND PREVENTIVE MAINTENANCE 9

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V TROUBLESHOOTING 9

Introduction – Computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CD ROM Problems

Total: 45 Periods

COURSE OUTCOMES:

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

- Apply the knowledge of working principles of various hardware devices and functions of OS.
- Distinguish the characteristic features of various peripheral devices.
- Identify and analyze the problems on Internal and External components of Computer Hardware
- Apply the Installation procedures to maintain data security and integrity.
- Analyze the computer faults using various diagnosis techniques.

TEXT BOOKS:

1. Stephen J.Bigelow, “Trouble Shooting, Maintaining and Repairing PCs”, Tata McGraw- Hill, New Delhi, 2001.
2. Govindarajalu. B “IBM PC Clones Hardware, Troubleshooting and Maintenance”, TMH, 2nd Ed. 2002.

REFERENCE BOOKS:

1. Peter Abel, NiyazNizamuddin, “IMB PC Assembly Language and Programming”, Pearson Education, 2007.
2. Scott Mueller “Repairing PC’s”, PHI 1992.
3. Mike Meyers, “Introduction to PC Hardware and Troubleshooting”, Tata McGraw-Hill, 2003.
4. Craig Zacker& John Rourke, “The Complete Reference: PC Hardware”, Tata McGraw- Hill, New Delhi, 2001.

19UIT972	SOCIAL NETWORKS	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- Understand the concept of social network
- Learn knowledge in market and strategic interaction in network
- Learn the effects of social networks

UNIT I INTRODUCTION TO SOCIAL NETWORK 9

Introduction: Motivation – Different Sources of Network Data – Types of Networks – Tools for Visualizing Network Data – Review of Graph Theory Basics.

UNIT II STRUCTURAL AND LOCATIONAL PROPERTIES 9

Structural Properties of Networks – Notions of Centrality – Cohesiveness of Subgroups – Roles and Positions – Structural Equivalence – Representation of Network Positions – Block Models.

UNIT III SOCIAL NETWORK ANALYSIS 9

Introduction to Web – Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Network analysis – Development of Social Network Analysis – Key concepts and measures in network analysis – Electronic Sources for network analysis – Electronic discussion networks, Blogs and online communities, Web-based networks – Applications of Social Network Analysis.

UNIT IV MARKET AND STRATEGIC INTERACTION IN NETWORK 9

Matching Market: Bipartite Graphs and Perfect Matching – Prices and Market – Clearing Property – Network Models of Markets with Intermediaries – Price Setting in Market – Social Welfare – Trader Profit. Bargaining and Power in Network – Power in Social Network – Results of Network Exchange Experts – Modeling with Network Exchange – Stable outcomes – Modeling with Network Exchange – Balanced outcomes.

UNIT V NETWORK DYNAMICS 9

Information Cascade - Networks Effects – The Economy with Network Effects Industries with Network goods – Advanced Materials for Positive Externalities – Power Laws –The Effect of Search Tools and recommendations

Total: 45 Periods

COURSE OUTCOMES:

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

- Understand the basics of social networks. (Understand)
- Apply the knowledge of structural and locational properties to find the roles and network positions (Apply)
- Analyze the concepts of web analysis (Analyze)
- Analyze the market and strategic interaction in social networks. (Analyze)
- Analyze the performance effects of dynamic networks. (Analyze)

TEXT BOOKS:

1. David Easley, Jon Kleinberg, “Networks, Crowds, and Markets: Reasoning about a Highly Connected World”, Cambridge University Press, 1st Edition, 2010.
2. Stanley Wasserman, Katherine Faust,” Social Network Analysis: Methods and Applications”, Cambridge University Press, 2nd Edition, 1999.

REFERENCE BOOKS:

1. Charu C. Aggarwal, “Social Network Data Analytics”, Springer, 1st Edition, 2011.
2. Dion Gohand Schubert Foo” Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively”, IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soule-Dupuy, “Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling”, IGI Global Snippet, 2009.
4. John G. Breslin, Alexander Passant and Stefan Decker, “The Social Semantic Web”, Springer, 1st Edition, 2009.

19UIT973	CYBER FORENSICS TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To set high forensics and ethical standards for cyber security, digital and computer forensics
- To know the hackers and the counter measures against malicious attacks
- To know the Cyber Forensics to Law Enforcement

UNIT I INTRODUCTION TO CYBER FORENSICS 9

Introduction: Information Security Investigations – Corporate Cyber Forensics – Scientific method in forensic analysis – Investigating large scale Data breach cases- Types of Computer Forensics Technology – Types of Military Computer Forensic Technology – Business Computer Forensic Technology – Internet Tracing Methods – Overview of Cyber Crime – Types of Cyber Crime.

UNIT II NETWORK FORENSIC INVESTIGATION 10

Network forensic and investigation - Log file as evidence – Network Traffic investigation – DNS Poisoning Techniques – Evidence Gathering from ARP Table – Evidence Gathering at the Data Link Layer: DHCP Database – Router Forensics – Investigating DoS Attacks – Types of DoS Attacks – Techniques to Detect DoS Attacks – Challenges in Investigating DoS Attacks.

UNIT III INTERNET AND EMAIL CRIME INVESTIGATION 10

Web Attacks Investigation – Types of Web Attacks – Overview of Web Logs – Investigating Web Attack – Investigating FTP Servers, IIS logs, Apache Logs – Investigating Static and Dynamic IP Addresses – Tools for Locating IP Addresses – Security Strategies for Web Applications. Internet Crime Investigation – Goals of Investigation – Steps for Investigating Internet Crime- Introduction to Tracking E-Mails – E-Mail Systems – E-Mail Crime – Identity Theft, Chain E-Mails, Phishing – E-Mail Spoofing – E-Mail Crimes Investigation – E- Mail Forensic Tools.

UNIT IV MOBILE FORENSICS 9

Mobile Forensics challenges – Cell Phone Crime – SIM Security – Mobile phone evidence extraction process – Mobile phones Potential evidence – Android security – Android Forensic Setup – Android Data Extraction Techniques – Android Data Recovery Techniques – Analyzing Mobile Malware – Overview of Forensic Tools

UNIT V CYBER CRIME LAW 7

Investigation of Cyber Crimes – Agencies for Investigation in India – Powers and Constitution Laws – Procedures followed by First Responders – Evidence Collection and Seizure Procedures of Digitalmediums – Penalties Under IT Act – Offences Under IT Act – Cyber Regulation Appellate Tribunal

Total: 45 Periods

COURSE OUTCOMES:

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

- Demonstrate the fundamentals of cyber Forensics technology and its types
- Make use of network components for forensic investigation
- Categories the internet and email crime investigation based on web attacks
- Examine the performance of mobile evidence extraction technique for android forensic
- Analyze the laws, acts and penalties of cybercrime regulation authorities

TEXT BOOKS:

1. Dave Gaza, Mathew Kane, "Computer Forensic Investigation Network Intrusions and Cyber Crime", EC-Council Press, USA, 1st Edition, 2010.
2. John R. Vacca, "Computer Forensic: Crime Scene Investigation", Charles River Media, USA, 2nd Edition, 2005.

REFERENCE BOOKS:

1. Dr. Darren, R. Heyes, "A Practical Guide to Computer Forensics Investigations", Pearson, USA, 1st Edition, 2014
2. Elogan Casey, "Handbook of Digital Forensics and Investigation", Elsevier, USA, 1st Edition, 2009.
3. SatishBommisetty, RohiTamma, HeatherMahalik,"Practical Mobile Forensics", PacktPublishing, UK, 1st Edition, 2014.
4. Ryder, RodneyD, "Guide to Cyber Law", Wadhwa Publishing, India, 3rd Edition, 2007.

19UIT974	ANIMATION TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- Acquire skills in generating computer graphics and animated pictures
- Acquire skills and mastery in the use of different software producing graphics and animation.
- Impart real-life advertisement exposure in an organization

UNIT I FUNDAMENTALS **9**

History of Animation, Introduction to Animation, Terms used in Animation, Types of Animation - Skills for Animation Artist - Basic Principles of Animation - Animator's Drawing Tools - Rapid Sketching & Drawing.

UNIT II ANIMATION **9**

Developing Animation Character - Anatomy & Body Language - Introduction to equipment required for animation - Developing the characters with computer animation, D virtual drawing for animation, sequential movement drawing - Thumbnails, motion studies, drawing for motion - Essentials & qualities of good animation characters.

UNIT III 2D ANIMATION **9**

Overview of Flash - Introduction to the flash interface - Setting stage dimensions, working with panels, panel layouts - Introduction to drawing and drawing tools in Flash - Panels - Description, modifying, Saving & deleting a panel - Layers & Views.

UNIT IV 3D ANIMATION **9**

Introduction - Context for 3D Studio Max - Exploring the Max Interface - Controlling & Configuring the view ports - Working with Files, importing exporting - Creating & editing primitive objects.

UNIT V MODELING **9**

Accessing sub objects and using modeling helpers - Introduction to modifier & using modifier stack - Drawing & Editing 2D Spines & shapes - Modeling with polygon & Patch - Using the Graphic Modeling & Painting with objects.

Total: 45 Periods

COURSE OUTCOMES:

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

- Apply the knowledge of principles of animation and techniques to create the own video and PPT creation.
- Apply the knowledge of computer animation to develop the characters.
- Select and apply the appropriate techniques to implement the 2D Animation.
- Select and apply the appropriate techniques to implement the 3D Animation.
- Apply the knowledge of modeling task to design an application.

TEXT BOOKS:

1. Chris Patmore," The Complete Animation course", Barons Educational Series, June 2010.
2. Robert R, Snow D, "Flash CS4 Professional Bible", Wiley Publication, 4th Edition, 2009.

REFERENCE BOOKS:

1. AlinGales,"FLASH MX For PC/Mac", Firewall Media, 2011.
2. Fred Halsall., "Multimedia Communications - Applications, Networks, Protocols & Standards", Pearson Education, 2009.
3. Kelly L. Murdock, "3ds Max- Bible", Wiley Publication, 3rd Edition, 2011.
4. Rajesh Maurya, “Computer Graphics”, Wiley Publications, 2nd Edition, 2010.

19UIT975	COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To understand the basic structure and operation of a digital Computer
- To discuss in detail the operation of the arithmetic unit including the algorithms& implementation of fixed -point addition, subtraction, multiplication & Division
- To study in detail the different types of control and the concept of pipelining
- To study the hierarchical memory system including cache memories and virtual Memory
- To study the different ways of communicating with I/O devices and standard I/O Interfaces

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional units - Basic operational concepts - Bus structures - Performance and Metrics - Memory Locations & addresses, Memory operations - Instructions and instruction sequencing - Hardware - Software Interface - Instruction set architecture - Addressing modes - RISC -CISC.

UNIT II COMPUTER ARITHMETIC 9

Addition and subtraction of signed numbers - Design of fast adders - Multiplication of positive numbers - Signed operand multiplication and fast multiplication - Integer division

UNIT III PROCESSOR AND CONTROL UNIT 9

Basic MIPS implementation - Building data path - Control Implementation scheme - Pipelining - Pipelined data path and control - Handling Data hazards & Control hazards - Superscalar Operation.

UNIT IV PARALLELISM 9

Instruction -level-parallelism - Parallel processing challenges - Flynn's classification -Hardware multithreading - Multi core processors

UNIT V MEMORY AND I/O SYSTEMS 9

Memory hierarchy - Memory technologies - Cache basics - Measuring and improving cache performance - Virtual memory, TLBs - Input/output system, programmed I/O, DMA and interrupts, Buses

Total: 45 Periods

COURSE OUTCOMES:

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

- Summarize the basic components of a computer, including CPU, memories, and input/output, and their organization.
- Solve the arithmetic operations of binary number system
- Analyze pipelined control units
- Explain parallel processing concepts and its challenges
- Analyze the performance of various memory

TEXT BOOKS:

1. David A. Patterson and John L. Hennessey, "Computer organization and design the hardware/ software interface", Morgan Kauffman, 5th Edition, 2014.
2. Carl Hamacher, ZvonkoVranesic and SafwatZaky, "Computer Organization", Tata McGraw Hill, 5th Edition, 2002.

REFERENCE BOOKS:

1. William Stallings, "Computer Organization and Architecture", Pearson Education, 7th Edition, 2006.
2. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Pearson Education, 2nd Edition, 2005.
3. Govindarajalu, "Computer Architecture and Organization", Design Principles and Applications, Tata McGraw Hill, New Delhi, 1st Edition, 2005.
4. John P. Hayes,"Computer Architecture and Organization", Tata McGraw Hill, 3rd Edition, 1998.

19UIT976	FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		2	0	2	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram
- To make a study of SQL and relational database design
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design

UNIT I INTRODUCTION **10**

Introduction to File and Database systems – Database system structure - Database users and administrator – Data models – Introduction to Network and Hierarchical Models – ER model – Introduction to Relational database.

UNIT II RELATIONAL MODEL **10**

Relational Model – Types – Keys- Relational Algebra – Fundamental Operations and Additional Operations – SQL – Data Definition – Queries in SQL – Updates – Views – Integrity and Security – Relational Database design – Functional Dependences and Normalization for Relational Databases

UNIT III DATA STORAGE AND QUERY PROCESSING **10**

Record storage and Primary file organization – Secondary Storage Devices – Operations on Files – Heap File – Sorted Files – Indexing and Hashing Techniques – RAID – Query Processing – Overview – Cost estimation.

LIST OF EXPRIMENTS: **30**

1. Data Definition, Table Creation, Constraints.
2. Insert, Select Commands, Update & Delete Commands.
3. Nested Queries & Join Queries
4. Views
5. High level programming language extensions (Control structures, Procedures and Functions).
6. Front end tools
7. Forms
8. Triggers
9. Menu Design
10. Reports.

Total: 30+30Periods

COURSE OUTCOMES:

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

- Understand fundamentals of data models and database system using ER diagram.
- Apply the SQL query in relational database
- Choose an appropriate normalization techniques
- Analyze various storage techniques.
- Apply query processing techniques

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, Sudharshan. S, “Database System Concepts”, Tata McGraw Hill, 5th Ed.,2006.
2. Date C.J. Kannan A, Swamynathan S, “An Introduction to Database Systems”, Pearson Education, 8th Ed., 2006.

REFERENCE BOOKS:

1. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Pearson Addision Wesley,4th Ed., 2007.
2. Raghu Ramakrishnan, "Database management Systems", Tata McGraw Hill, 3rd Ed.
3. Singh.S.K,"Database Systems Concpets, Design and Applications", Pearson Education, 1st Ed, 2006
4. Hector Garcia-Molina, Jeffrey D.Ullman, Jennifer Widom, "Database System: The Complete Book", Pearson Education, 4th Ed., 2009

19UIT977	LEARNING IT ESSENTIALS BY DOING	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To describe the working of Internet based applications
- To design and develop demos using Alice tool
- To design and test simple programs in C language
- To document artifacts using common quality standards
- To design simple data store using RDBMS concepts and implement
- To develop a working website with all above learning

UNIT I **COMPUTER ARCHITECTURE** **9**

Fundamentals of Computer architecture – Introduction – Organization of a small computer Central Processing Unit – Execution cycle – Instruction Categories- Measure of CPU Performance Memory – Input/Output devices – BUS – addressing modes. System Software – Assemblers – Loaders and linkers – Compilers and Interpreters Operating system – introduction –memory management schemes Process management Scheduling – threads

UNIT II **PROBLEM SOLVING** **9**

Problem solving with algorithms – Programming styles – Coding Standards and Best practices – Introduction to C Programming Testing and Debugging. Code reviews System Development Methodologies – Software development Models User interface Design – introduction – The process – Elements of UI design & reports.

UNIT III **DATA PROCESSING** **9**

RDBMS – data processing – the database technology – data models ER modeling Concept – notations – Extended ER features Logical database design –normalization SQL – DDL statements – DML statements –DCL statements Writing Simple queries – SQL Tuning techniques – Embedded SQL – OLTP.

UNIT IV **OBJECT ORIENTED ANALYSIS** **9**

Objected oriented concepts – object oriented programming UML Class Diagrams – relationship – Inheritance – Abstract classes – polymorphism Object Oriented Design methodology – Common Base class Alice Tool – Application of OOC using Alice tool.

UNIT V **NETWORKING** **9**

Client server computing – Internetworking – Computer Networks – Working with TCP/IP – IP address– Sub netting – DNS – VPN – proxy servers World Wide Web – Components of web application –browsers and Web Servers URL – HTML – HTTP protocol – Web Applications – Application servers– Web Security.

Total: 45 Periods

COURSE OUTCOMES:

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

- Describe working of Internet based applications
- Design and develop demos using Alice tool
- Design and test simple programs in C language
- Document artifacts using common quality standards
- Design simple data store using RDBMS concepts and implement
- Develop a working website with all above learning

TEXT BOOKS:

1. Andrew S. Tanenbaum, “Structured Computer Organization”, PHI, 3rd Edition, 1991.
2. Silberschatz and Galvin,” Operating System Concepts”, Addision – Wesley, 4th Edition, 1995.

REFERENCE BOOKS:

1. Dromey R.G,” How to solve it by Computers”, PHI, 1992.
2. Kernighan, Ritchie,” ANSI C language”, PHI, 1992.
3. Wilbert O. Galitz,” Essential Guide to User Interface Design”, John Wiley, 1997. Alex berson,” Client server Architecture”, Mc Grew Hill International, 1994.

19UIT978	WEBSITE DESIGNING	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To design a stylistic webpage using HTML and CSS
- To know the basic knowledge of word press and Dreamweaver
- To validate webpage creation using java script and PHP

UNIT I HTML BASICS **9**

Basic HTML - History - Page Structure - Block Elements – Inline Elements, More HTML Elements - List - Tables – Forms - Linking Web Pages.

UNIT II CASCADING STYLE SHEETS FOR STYLING **10**

Introduction to CSS – Importing a Style sheet - Embedded Style sheet - CSS Rules –Style Types - External, Internal and Inline Style sheets - CSS Selectors.

UNIT III WORD PRESS & ADOBE DREAMWEAVER **8**

Word press: Word press Introduction - Working with word press - understanding the loop - Template tags - Customizing the loop - Data Management - Project in Word press. Adobe Dreamweaver: Introduction – Design and layout tools - Code Navigator - HTML and CSS Starter Pages - Creating a new site - Adding Text and Images - Styling Your Pages with CSS.

UNIT IV CLIENT-SIDE PROGRAMMING - JAVA SCRIPT **10**

Exploring JavaScript - Expressions and control flow in Java Script - Functions - Objects - Arrays - Validating User Input with Java Script.

UNIT V SERVER-SIDE PROGRAMMING - PHP **9**

Introduction of PHP - Basic Syntax – Expressions and Control flow in PHP - PHP functions and objects - PHP arrays - Accessing MySql using PHP

Total: 45 Periods

COURSE OUTCOMES:

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

- Apply the knowledge of HTML to create webpage
- Make use of CSS style sheet for a web application
- Design and manage pages and posts using Word press and Adobe Dreamweaver
- Identify and Analyze client side programming using java script
- Analyze the server side programming using PHP and identify the database connection

TEXT BOOKS:

1. Learning PHP, MySQL, JavaScript,and CSS ,second edition by Robin Nixon, 2nd edition, 2012.
2. Marty Stepp, Jessica Miller, and Victoria Kirst , “Web Programming”, Step by Step Publication, 2nd edition, 2009
3. B.Williams, D.Damstra,H.Stern,“Professional WordPress: Design and Development”, Wiley Publication, 3rd Edition
4. Jeremy Osborn, Greg Heald, “Adobe Dreamweaver CS6 Digital Classroom”, Wiley Education, 2016.

REFERENCE BOOKS:

1. H.M.Deitel, P.J.Deitel, Goldberg, "Internet & World Wide Web How To Program", Pearson Education, Third Edition, 2006.
2. Robert. W. Sebesta, "Programming the World Wide Web", Pearson Education, Seventh Edition, 2012.
3. Kogent Learning Solutions Inc., “Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Book”, Dreamtech Press.
4. http://www.w3schools.com

OTHER DEPARTMENT COURSES

Course Code	Course Title	L	T	P	C	Offered Dept
19UIT326	Fundamentals of C Programming (Integrated Course)	2	0	2	3	ECE
19UIT426	Data Structure using C (Integrated Course)	3	0	3	4.5	EEE
19UIT427	Object Oriented Programming In Python	3	0	0	3	AGRI
19UIT428	Object Oriented Programming In Python Laboratory	0	0	2	1.5	AGRI
19UIT429	Introduction to Data Structures & Algorithms (Integrated Course)	2	0	2	3	ECE
19UIT623	Object Oriented Programming and Data Structures	2	0	3	3.5	Bio-Medical

19UIT326	FUNDAMENTALS OF C PROGRAMMING (INTEGRATED COURSE)	L	T	P	C
		2	0	2	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To develop C Programs using basic programming constructs
- To develop C programs using functions, array and string
- To develop applications in C using pointers and structures

UNIT I BASICS OF C, DECISION CONTROL AND LOOPING STATEMENTS 10+10

Introduction to C - Introduction, Structure of C program, Writing simple C Program, Input and Output statements, Conditional Branching Statements - Iterative Statements, Nested Loops, Break and Continue Statements, goto Statement.

List of Experiments:

1. Implement Simple C Programs
2. Implement C programs using Operators
3. Implement C Programs using Decision Control statements
4. Implement C Programs using Looping statements

UNIT II ARRAYS, STRINGS AND FUNCTION 10+10

Arrays – Introduction, Declaration of Arrays, Accessing the Elements of an Array, Operations on Arrays, Passing Arrays to functions, Two dimensional Arrays, Multidimensional Arrays, Strings – Introduction, Operations on Strings, Arrays of Strings.

Function: Introduction, function declaration and definition, function call, return statement, Passing parameter to function, Storage classes, Recursive function.

List of Experiments:

1. Implement C Programs using Arrays
2. Implement C Programs using Strings
3. Implement C Programs using Function

UNIT III POINTERS AND STRUCTURES 10+10

Pointers - Introduction to Pointers - Declaring Pointer Variables, Pointers and Arrays, Pointers to Pointers, Dynamic memory allocation, Structure - Introduction, Nested Structures, Arrays of Structures, Structures and Functions.

Lab Experiments:

1. Implement C Programs using Pointers
2. Implement C Programs using array of Pointers
3. Implement C Programs using Structures

Total: 30(L) + 30(P) = 60Periods

COURSE OUTCOMES:

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

- Infer the Knowledge of fundamental C programming concepts [Understand]
- Apply various concepts of C program for solving problems [Apply]
- Analyze different features of C program for a given scenario [Analysis]
- Design a solution without anomalies using C programming concept for the given applications [Design]
- Select and apply appropriate tools to implement any few concepts of C programming [Modern Tool Usage]
- Identify the requirement and take further preparation in order to adopt Technological change [Lifelong learning / Communication]

TEXT BOOKS:

1. Reema Thareja,"Programming in C", 2nd Edition, Oxford university press, 2015.
2. Yashavant P. Kanetkar,"Let us C", 5th Edition, BPB Publications, 2004

REFERENCE BOOKS:

1. Brian.K.Kernighan,Dennis.M.Ritchie,"The C Programming Language", 2nd Edition, Pearson,
2. Pradip Dey,Manas Ghosh, "Computer fundamentals and programming in C", 2nd Edition, Oxford university press,2013.
3. Noel Kalicharan,"Learn to program with C", Apress, 2015.

19UIT426	DATA STRUCTURE USING C (INTEGRATED COURSE)	L	T	P	C
		3	0	3	4.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

UNIT I LINEAR DATA STRUCUTRE – ARRAYS, LIST 10+10

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

Experiments:

1. Program to implement Arrays.
2. Program to implement List ADT
3. Program to implement Polynomial Arithmetic using Linked List

UNIT II LINEAR DATA STRUCTURE – STACK, QUEUE 10+10

Stack ADT: Array & Linked Representation – Applications of Stack – Balancing Parenthesis – Arithmetic expressions (Conversion & Evaluation) – Recursion - Queue ADT: Array & Linked Representation – Circular Queue – Applications of Queue.

Experiments:

1. Program to implement stack ADT using array and linked list
2. Program to implement stack and use it to Evaluate postfix expression
3. Program to implement queue ADT use array and linked list

UNIT III NON-LINEAR DATA STRUCUTRE – TREE 9+9

Introduction – Basic Terminology – Traversal – Operations: Binary trees – Expression Tree – Binary Search trees – AVL trees- B-trees. Heap: Binary Heaps – Applications of Heap

Experiments:

1. Program to implement binary search tree
2. Program to implement insertion and deletion in AVL trees
3. Program to implement priority queue using binary heaps

UNIT IV NON-LINEAR DATA STRUCTURE – GRAPH 8+8

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.

Experiments:

1. Program to implement Prim's algorithm using priority queues to find MST of an undirected graph
2. Program to implement Kruskal's algorithm using priority queues to find MST of an undirected graph

UNIT V SEARCHING, SORTING AND HASHING 8+8

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.

Experiments:

1. Program to implement searching technique.
2. Program to implement sorting technique.
3. Program to implement hashing technique.

Total: 90 Periods

COURSE OUTCOMES:

- Understand the various applications like linear and non-linear data structures to solve the problems in relevant applications. [Understand]
- Apply the linear and non-linear data structures and sorting searching and hashing algorithms appropriately to solve variety of computational problems[Apply]
- Analyze the different Program to implementations of various data structure algorithms and to calculate the efficiency of algorithms.[Analyze]
- Design and develop efficient linear, non-linear, sorting, searching and hashing data structure algorithms to solve problems. [Design]
- Evaluate the problems and find solutions using linear, non-linear applications, searching, sorting and hashing algorithms.[Evaluate]
- Select and apply appropriate data structures to design algorithms using modern tool.[Modern Tool Usage]

TEXT BOOKS

1. ReemaThareja, "Data Structures Using C", Oxford University Press, Second Edition, 2014.
2. Weiss. M.A, "Data Structures and Algorithm Analysis in C", Pearson Education, 2nd Edition, 2012

REFERENCE BOOKS

1. Aaron M.Tenenbaum, YedidyahLangsam, Moshe J.Augenstein, "Data Structures using C", Pearson Education India, 7th Edition, New Delhi, 2009.
2. Aho.V, Hopcroft.J.E, Ullman.J.D, "Data Structures and Algorithms", Pearson Education, 1st Edition Reprint, 2006.
3. Gilberg.R.F, Forouzan.B.A, "Data Structures", Thomson India Education, 2nd Edition, 2005.
4. Sara Baase and A.VanGelder, "Computer Algorithms", Pearson Education, 3rd Edition, 2005.
5. Cormen.T.H, C.A.Leiserson.B.A, R.L.Rivest and C.Stein, "Introduction to Algorithms", Prentice Hall of India, 3rd Edition, 2009.

19UIT427	OBJECT ORIENTED PROGRAMMING IN PYTHON	L	T	P	C
		3	0	0	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To acquire programming skills in core python
- To learn about the usage of python shell for running programs
- To understand the different data types available in python.
- To acquire object oriented skills in python
- To understand the creation and usage of various modules and packages.

UNIT I FUNDAMENTALS OF PYTHON PROGRAMMING 9

Introduction – Data types – variables –Basic I/O operations – Decision Making – Loops – Modules and packages – Organizing modules –Third party libraries – Case study.Experiments:

UNIT II PYTHON DATA STRUCTURES 9

Python Data structures – Tuples and named tuples – Dictionaries – counters – Lists – Sorting lists – Sets – Extending built-ins – Queues – FIFO Queue – LIFO Queue – priority queue – Case study

UNIT III OBJECT ORIENTED PROGRAMMING METHODOLOGIES 9

Object oriented programming – creating python classes – Initializing objects — Python object recognition – Data and behavior – Wrapping data in behavior using properties – Objects and classes – Abstraction – overview of inheritance and its types – Case study.

UNIT IV INHERITANCE AND POLYMORPHISM 9

Python built-in functions – Default arguments – variable arguments – Lists – unpacking arguments – Basic inheritance – Extending built-ins – Overriding and super – Multiple inheritance – polymorphism – Abstract base classes – case study.

UNIT V PYTHON STRINGS AND EXCEPTION HANDLING 9

Strings – String manipulation – String formatting – Escaping braces – Keyword arguments – Container lookups - object lookups – Exception handling – Raising exception – Effects of exception – Handling the exception - Exception hierarchy – Creating our own exceptions – case study.

Total: 45Periods

COURSE OUTCOMES:

- Infer the principles of object-oriented problem solving and programming and Outline the essential features and elements of the C++ programming language. [Understand]
- Apply the concepts of class, method, constructor, instance, data abstraction, function abstraction, inheritance, overriding, overloading, and polymorphism.[Apply]
- Analyze problems and implement simple python applications using an object-oriented software engineering approach.[Analyze]
- Design user interface using Tkinter and turtle graphics for application development.[Design]
- Use modern tools for the creation of various application software using python modules.[Modern Tool Usage]
- Function effectively as a member or leader in a team by participating in the development of software Project using oops concepts in python.[Individual and team member]

TEXT BOOKS:

1. Python 3 Object Oriented Programming - Second Edition by Dusty Phillips

REFERENCE BOOKS

1. Python crash course – 2nd Edition, "A hands-on project based introduction to programming" by Eric matthes.
2. Learning Python – 5th Edition by mark lutz – O'Reilly media
3. Introduction to python, Kenneth A. Lambert, Cengage.

19UIT428	OBJECT ORIENTED PROGRAMMING IN PYTHON LABORATORY	L	T	P	C
		0	0	2	1.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To interpret the use of procedural statements like assignments, conditional statements, loops and function calls.
- To infer the supported data structures like lists, dictionaries and tuples in Python.
- To understand the need for Object-oriented programming concepts in Python.

UNIT I FUNDAMENTALS OF PYTHON PROGRAMMING 9

1. Develop a program to implement basic I/O operations in python.

2. Develop a program to demonstrate decision making and loops in python.

3. Develop a python program to demonstrate lists, tuples and dictionary

4. Develop a python program to demonstrate sets and queues.

5. Develop a python program to demonstrate object initialization.

6. Develop a python program to demonstrate wrapper behavior using properties.

7. Develop a python program to implement single and multiple inheritance.

8. Develop a python program to implement single and multiple polymorphism and abstract classes.

9. Develop a python program to implement string handling and string formatting.

10. Develop a python program to implement Exception handling.

Total: 30 Periods

COURSE OUTCOMES:

- Describe the Python language syntax including control statements, loops and functions to write programs for a wide variety problem in mathematics, science, and games. [Understand]
- Implement the concepts of Object-oriented programming as used in Python using encapsulation, polymorphism and inheritance.[Apply]
- Examine the core data structures like lists, dictionaries, tuples and sets in Python to store, process and sort the data.[Analyze]
- Design user interface using various inbuilt-modules and packages in python[Design]

- Select and apply appropriate tools to implement the advanced concepts of python programming[Modern Tool Usage]
- Function effectively as a member or leader in a team by participating in the development of software Project using oops concepts in python.[Individual and team member]

SOFTWARE AND HARDWARE REQUIREMENT

Hardware Requirement:

- Personal Computers – 30 Nos.

Software Requirement:

- Python 3.0 and above, Windows/Linux OS, IDEs – Pycharm (optional)

19UIT429	INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS (INTEGRATED COURSE)	L	T	P	C
		2	0	2	3

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

UNIT I LINEAR DATA STRUCUTRE – ARRAYS, LIST 10+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

Experiments:

1. Program to implement Arrays.
2. Program to implement Singly Linked List ADT
3. Program to implementDoubly Linked List ADT

UNIT II LINEAR DATA STRUCTURE – STACK, QUEUE 10+12

Stack ADT: Array & Linked Representation – Applications of Stack – Balancing Parenthesis – Arithmetic expressions (Conversion & Evaluation) – Recursion - Queue ADT: Array & Linked Representation – Circular Queue – Applications of Queue.

Experiments:

1. Program to implement stack ADT using array and linked list
2. Program to implement stack and use it to Evaluate postfix expression
3. Program to implement queue ADT use array and linked list

UNIT III NON-LINEAR DATA STRUCUTRE – TREE, GRAPH 10+9

Tree – Basic Terminology – Traversal – Operations: Binary trees – Expression Tree – Binary Search tree – AVL tree – Graph Terminology – Representation of Graphs – Graph Traversal – Topological sort – Minimum Spanning Tree – Shortest path algorithm.

Experiments:

1. Program to implement insertion and deletion in AVL trees
2. Program to implement Prim's /Kruskal'salgorithm using priority queues to find MST of an undirected graph.

Total: 60 Periods

COURSE OUTCOMES:

- Understand the various applications like linear and non-linear data structures to solve the problems in relevant applications. [Understand]
- Apply the linear and non-linear data structures to solve variety of computational problems.[Apply]
- Analyze the different Program to implementations of various data structure algorithms and to calculate the efficiency of algorithms.[Analyze]
- Design and develop efficient linear, non-linear, data structure algorithms to solve problems.[Design]
- Evaluate the problems and find solutions using various linear and non-linear applications.[Evaluate]
- Select and apply appropriate data structures to design algorithms using modern tool.[Modern Tool Usage]

TEXT BOOKS:

1. ReemaThareja, “Data Structures Using C”, Oxford University Press, Second Edition, 2014.
2. Weiss. M.A, “Data Structures and Algorithm Analysis in C", Pearson Education, 2nd Edition, 2012

REFERENCE BOOKS

1. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, ”Data Structures using C”, Pearson Education Asia, 2004
2. Aho.V, Hopcroft.J.E, Ullman.J.D, "Data Structures and Algorithms", Pearson Education, 1st Edition Reprint, 2006.
3. Gilberg.R.F, Forouzan.B.A, "Data Structures", Thomson India Education, 2nd Edition, 2005.
4. Sara Baase and A.VanGelder, "Computer Algorithms", Pearson Education, 3rd Edition, 2005.
5. Cormen.T.H, C.A.Leiserson.B.A, R.L.Rivest and C.Stein, "Introduction to Algorithms", Prentice Hall of India, 3rd Edition, 2009.

19UIT623	OBJECT ORIENTED PROGRAMMING AND DATA STRUCTURES	L	T	P	C
		2	0	3	3.5

COURSE DESIGNATION :

PRE-REQUISTIES:

COURSE OBJECTIVES:

- To understand the principles of object oriented programming
- To explain the systematic way of solving problems using various linear and non-linear data structures
- To demonstrate implement the different linear and non-linear data structures

UNIT I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING 10

Introduction – Tokens – Expressions-Control Structures-Functions in C++, Classes and Objects, Constructors and Destructors, Operator Overloading, Inheritance-Extending classes, Virtual Functions and Polymorphism, Exception handling.

UNIT II LINEAR DATA STRUCTURES 10

Abstract Data Type –Arrays: Accessing Elements – Operations – List ADT: Memory Allocation and De-allocation – Singly linked lists – Circular linked lists – Doubly linked lists – Applications of lists – Stack ADT: Array & Linked Representation – Applications of Stack, Queue ADT: Array & Linked Representation – Applications of Queue.

UNIT III NON-LINEAR DATA STRUCUTRE 10+9

Tree – Basic Terminology – Traversal – Operations: Binary trees – Binary Search tree – AVL tree – Graph Terminology – Representation of Graphs – Graph Traversal – Topological sort – Minimum Spanning Tree – Shortest path algorithm.

List of Exercises / Experiments:

1. Program to implement Operator Overloading.
2. Program to implement Classes with constructor, destructor and copy constructor.
3. Program to implement Classes with inheritance concepts.
4. Program to implement Arrays ADT.
5. Program to implement List ADT.
6. Program to implement stack ADT using array and linked list.
7. Program to implement queue ADT use array and linked list.
8. Program to implement binary search tree.
9. Program to implement insertion and deletion in AVL trees.
10. Program to implement Prim's / Kruskal's algorithm using priority queues to find MST of an undirected graph

Lecture: 30, Practical: 45, Total: 75 Periods

COURSE OUTCOMES:

- Understand the use of linear, non-linear data structures and object oriented approaches to solve the problems in real time applications [Understand]
- Apply the linear, non-linear data structures and object oriented approaches to solve variety of computational problems.[Apply]
- Analyze the efficiency of various algorithmic approach through object oriented programming to solve real world applications with approach [Analyze]
- Design and develop efficient and effective algorithms to solve problems.[Design]
- Evaluate the problems and find solutions using various linear and non-linear applications.[Evaluate]
- Select and apply appropriate data structures to design algorithms using modern tool.[Modern Tool Usage]

Text Books:

1. E.Balagurusamy,"Object Oriented Programming with C++", Tata McGrawHill, 6thEdition, 2013.

2. Weiss. M.A,"Data Structures and Algorithm Analysis in C++", Pearson Education, 4thEdition,2014.

Reference Books:

1. Bhusan Trivedi,"Programming with ANSI C++ - A Step by Step Approach", Oxford University Press, 2nd Edition, 2014.

2. Stroustrup B,"The C++ Programming Language", Pearson Education, 4thEdition,2013.

3. Aho V, Hopcroft J E, Ullman.J.D,"Data Structures and Algorithms", Pearson Education, 1stEdition Reprint, 2006.

4. Gilberg R F, Forouzan.B.A,"DataStructures: a Pseudocode Approach with C++", Thomson India Education, 2ndEdition,2005

HARDWARE/SOFTWARE REQUIREMENTS

Hardware Requirements:

Computer Required: 30 No's

Minimum Requirement: Processor- Pentium IV, Ram: 1 GB, Hard Disk: 80 GB

Software Requirements:

Operating System: Linux (Ubuntu / Fedora / Debian / Mint OS) / Windows

Turbo C Version 3 or GCC Version 4 / Built in Linux / DEVC++