KUMARAGURUCOLLEGE OF TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University, Chennai)

COIMBATORE – 641049

REGULATIONS 2014

CURRICULUM AND SYLLABUS

IIIrd- VIIIth Semesters

B.TECH INFORMATION TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

Vision

The department aspires to transform individuals in pursuit of lifetime learning and service into highly motivated professionals through educational, cultural and professional opportunities.

Mission

1. To provide academic programs that equip, enlighten and empower the students to learn technology through practice, service and outreach
2. To educate the students about social responsibilities and entrepreneurship
3. To encourage research through continuous improvement in infrastructure, curriculum and faculty development in collaboration with industry and institutions

Programme Educational Objectives (PEOs)

1 Graduates will have progressive learning and successful career in Information, Communication Technologies and their applications.

2 Graduates will be leaders in their chosen field.

3 Graduates will practice the acquired technical skills and knowledge for the benefit of society.

Programme Outcomes (POs)

PO1 **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the IT enabled solution of complex engineering problems.

PO2 **Problem Analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated IT enabled conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 **Design/ Development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 **Modern tool usage:** Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 **engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, safety, legal and cultural issues and the consequent responsibilities relevant to the professional

ering practice.

PO7 **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

KUMARAGURU COLLEGE OF TECHNOLOGY
COIMBATORE – 641 049
REGULATIONS 2014
DEPARTMENT OF INFORMATION TECHNOLOGY
CURRICULUM

SEMESTER III

Code No.	Course Title	L	T	P	C
Theory					
U14MAT308	Discrete Mathematics	3	1	0	4
U14ITT301	Data Structures and Algorithms	3	0	0	3
U14ITT302	Digital Systems and Design	3	0	0	3
U14ITT303	Object Oriented Programming with C++	3	0	0	3
U14ITT304	Computer Architecture	3	1	0	4
U14GST001	Environmental Science and Engineering	3	0	0	3
Practical					
U14ITP301	Data Structures and Algorithms Laboratory	0	0	2	1
U14ITP302	Digital System and Design Laboratory	0	0	2	1
U14ITP303	Object Oriented Programming Laboratory	0	0	2	1
U14GHP301	Social Values	1	0	1	1

24 Credits

SEMESTER IV

Code No.	Course Title	L	T	P	C
Theory					
U14 MAT402	Signals and Systems	3	0	2	4
U14ITT401	Microprocessors and Microcontroller	3	1	0	4
U14ITT402	Database Management Systems	3	0	0	3
U14ITT403	User Interface Design	3	0	0	3
U14ITT404	Design and Analysis of Algorithms	3	1	0	4
U14GST007	Professional Ethics	3	0	0	3
Practical					
U14ITP401	Microprocessors Laboratory	0	0	2	1
U14ITP402	Database Management Systems Laboratory	0	0	2	1
U14ENP401	Communication Skills Laboratory	0	0	2	1
U14GHP401	National and Global Values	1	0	1	1

25 Credits

SEMESTER V

Code No.	Course Title	L	T	P	C
Theory					
U14MAT506	Probability and Queuing Theory	3	1	0	4
U14ITT501	Operating Systems	3	1	0	4
U14ITT502	Software Engineering	3	0	0	3
U14ITT503	Java Programming	3	1	0	4
U14ITT504	Computer Networks	3	0	0	3
U14ECT511	Digital Signal Processing	3	1	0	4
Practical					
U14ITP501	Operating Systems Laboratory	0	0	2	1
U14ITP502	Software Engineering Laboratory	0	0	2	1
U14ITP503	Java Programming Laboratory	0	0	2	1

25 Credits

SEMESTER VI

Code No.	Course Title	L	T	P	C
Theory					
U14ITT601	Web Technology	3	0	0	3
U14ITT602	Data Warehousing and Data Mining	3	0	2	4
U14ITT603	Cryptography and Network Security	3	0	0	3
U14ITT604	Principles of Compiler Design	3	1	0	4
E1	Elective I	3	1	0	4
E2	Elective II	3	0	0	3
EOC	Elective - One Credit Course	1	0	0	1
Practical					
U14ITP601	Web Technology Laboratory	0	0	2	1
U14ITP602	Computer Networks Laboratory	0	0	2	1
U14ITP603	Mobile Applications Programming Laboratory	0	0	2	1

25 Credits

SEMESTER VII

Code No.	Course Title	L	T	P	C
Theory					
U14ITT701	Mobile and Pervasive Computing	3	1	0	4
U14GST003	Principles of Management	3	0	0	3
U14ITT702	Cloud Computing	3	1	0	4
E3	Elective III	3	0	0	3
E4	Elective IV	3	0	0	3
E5	Elective V	3	0	0	3
Practical					
U14ITP701	Wireless Networks Laboratory	0	0	2	1
U14ITP702	Cloud Computing Laboratory	0	0	2	1
U14ITP703	Mini Project Review / Industrial Training	0	0	2	1

23 Credits

SEMESTER VIII

Code No.	Course Title	L	T	P	C
Theory					
E6	Elective VI	3	0	0	3
E7	Elective VII	3	1	0	4
E8	Elective VIII	3	0	0	3
Practical					
U14ITP801	Project Work	0	0	18	6

16 Credits

TOTAL CREDITS : 186

ELECTIVES FOR SIXTH SEMESTER

Code No.	Course Title	L	T	P	C
Elective I					
U14ECT614	Principles of Communication	3	1	0	4
U14ITTE11	Theory of Computation	3	1	0	4
U14ITTE12	C # and .NET Programming	3	1	0	4
U14 MAT601	Numerical Methods	3	0	2	4
U14ITTE13	Embedded Systems	3	0	2	4

Elective II

U14CST601	Artificial Intelligence	3	0	0	3
U14ITTE21	Software Architecture	3	0	0	3
U14ITTE22	Computer Graphics	3	0	0	3
U14ITTE23	TCP / IP and Socket Programming	3	0	0	3
U14ITTE24	Information Coding Techniques	3	0	0	3

Elective III

U14ITTE31	Business Process Models	3	0	0	3
U14ITTE32	Building Enterprise Applications	3	0	0	3
U14GST003	Total Quality Management	3	0	0	3
U14GST004	Operations Research	3	0	0	3
U14GST005	Engineering Economics and Financial Management	3	0	0	3
U14GST008	Foundation Skills in Integrated Product Development	3	0	0	3

Electives IV

U14ITTE41	High Speed Networks	3	0	0	3
U14ITTE42	Ad hoc and Sensor Networks	3	0	0	3
U14ITTE43	Internet of Things	3	0	0	3

Electives V

U14ITTE51	Multimedia Systems	3	0	0	3
U14ITTE52	Software Quality Assurance and Testing	3	0	0	3
U14ITTE53	Real Time Systems	3	0	0	3
U14ITTE54	Computational Intelligence	3	0	0	3

Electives VI

U14ITTE61	Distributed Systems	3	0	0	3
U14ITTE62	Information Security	3	0	0	3
U14ITTE63	Management Information System	3	0	0	3

Electives VII

U14ITTE71	Open Source Software	3	1	0	4
U14ITTE72	Service Oriented Architecture	3	1	0	4
U14ITTE73	Semantic Web	3	1	0	4

Elective VIII

U14ITTE81	Decision Support Systems	3	0	0	3
U14ITTE82	Software Project Management	3	0	0	3
U14ITTE83	Business Intelligence and its Applications	3	0	0	3

ONE CREDIT COURSES

Course code	Course Title	Industry that will offer the course
U14IT*IN*01	Innovation and Entrepreneurship	California State University, Northridge
U14IT*IN*02	ERP and Business Applications	Charan Software, Coimbatore

SEMESTER III

U14MAT308 DISCRETE MATHEMATICS

L	T	P	C
3	1	0	4

Course Outcomes:

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

CO1: Construct simple mathematical proofs and possess the ability to verify them.

CO2: Understand logical arguments and logical construction.

CO3: Know various graphs and its algorithms in computer programs.

CO4: Understanding of sets and relations.

CO5: Describe computer programs in a formal mathematical manner

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	S									
CO2				S		S						
CO3	M	W			S							
CO4	W	W										
CO5		W	S	M								

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	Course End Survey

SET THEORY **9+3 Hours**

Introduction to the theory of sets, combination of sets, power sets, finite and infinite sets, principle of inclusion and exclusion.

LOGIC **9+3 Hours**

Proposition, Predicate logic, Logic operators, Logic proposition and proof, methods of proofs.

GRAPH THEORY 9+3 Hours

Path, Cycles, Handshaking theorem, Bipartite graphs, Sub-graphs, Graph isomorphism, Operation on graphs, Eulerian graphs and Hamiltonian graphs, Planar graphs, Euler formula, traveling salesman problem, Shortest path algorithms.

RELATIONS 9+3 Hours

Definitions and properties, Equivalence relations and equivalence classes, Representations of relations by binary matrices and diagraph, Operations on relations, Closure of a relations, Reflexive, Symmetric and transitive closures, Warshall's algorithm to compute transitive closure of a relation.

BOOLEAN ALGEBRA AND LATTICES 9+3 Hours

Partial order relations, POSETS, lattices, Boolean Algebra and Boolean Functions, Introduction to Boolean algebra and Boolean functions. Different representations of Boolean functions. Application of Boolean functions to synthesis of circuits.

Theory: 45 Hrs Tutorial: 15 Hrs **Total Hours:60**

REFERENCES

1. Liu C.L, "Elements of Discrete Mathematics, Second Edition, Mc Graw Hill 1985.
2. Mott J.L, Kandel A. and Baker T.P., "Discrete Mathematics for Computer Scientists and Mathematicians, Second Edition, Prentice Hall India, 1986.
3. Harary F, Graph Theory, Narosa, 1969.
4. Thomas H.C., A Leiserson C.E., Rivest R.L, Stein C.A., "Introduction to a Algorithms(2nd Edition),MIT press and McGraw-Hill.2001.

U14ITT301 DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Explain the linear data structures and its operations.

CO2: Explain the non-linear data structures and its operations

CO3: Identify and use appropriate data structure to solve problems.

CO4: Explain various searching and sorting algorithms.

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	W										M
CO2	M	W										M
CO3	S	S										M
CO4	M	W										M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

LISTS, STACKS AND QUEUES 9 Hours

Abstract Data Type (ADT) – The List ADT and its applications – The Stack ADT and its applications – The Queue ADT applications

TREES 9 Hours

Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees-Threaded Binary trees – Tree Traversals - Priority Queues (Heaps) – Model – Simple implementations – Binary Heap

SEARCH STRUCTURES AND HASHING 9 Hours

AVL Trees – Splay Trees – B-Trees -Hashing – General Idea – Hash Function – Separate Chaining – Open Addressing – Linear Probing

GRAPHS 10 Hours

Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm – Kruskal's Algorithm - Applications of Depth-First Search – Undirected Graphs – Biconnectivity.

SORTING & SEARCHING 8 Hours

Sorting-Preliminaries – Insertion Sort – Shell sort – Heap sort – Merge sort – Quick sort – External Sorting –Searching –Linear Search-Binary Search

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. M.A.Weiss, "Data Structures and Algorithm Analysis in C", Second edition, Pearson Education Asia, 2007.
2. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C and C++", 2nd ed, Prentice-Hall of India, 2009.
3. Alfred V. Aho, John E. Hopcroft and Jeffry D. Ullman, Data Structures & Algorithms, Pearson Education, New Delhi, 2009.

U14ITT302 DIGITAL SYSTEMS AND DESIGN

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Translate numerical values in various number systems and perform number conversions between number systems.

CO2: Demonstrate the knowledge of logic gates, Boolean algebra and apply optimal minimization techniques to simplify the Boolean function.

CO3: Analyze and design combinational and sequential circuits

CO4: Apply the knowledge to solve the real time problems related to digital circuits.

CO5: Compare various programmable devices and digital logic families.

Pre-requisite:

1. U14EET212 - Electrical and Electronic Circuits

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	W										
CO2	M	M										W
CO3	S	M										M
CO4	M	M	W									W
CO5	M	M										W

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignments	1. Course Exit Survey

NUMBER SYSTEM AND BASIC LOGIC **10 Hours**

Number systems-Binary, Octal, Hexadecimal, Number base conversions, Binary codes: Weighted codes-BCD - 8421-2421, Non Weighted codes - Gray code - Excess 3 code Binary arithmetic, 1's complements, 2's complements, and Code conversions. Study of logic gates-

Boolean algebra, Boolean postulates and laws –De-Morgan's Theorem- Principle of Duality – Minterm- Maxterm- Canonical forms - Conversion between canonical forms, Karnaugh map Minimization – Don't care conditions, Tabulation method.

COMBINATIONAL CIRCUITS **9 Hours**

Problem formulation and design of combinational circuits, adder, subtractor, Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- Magnitude Comparator , parity checker , Encoder , decoder, Multiplexer/ Demultiplexer , code converters, Function realization using gates and multiplexers.

SEQUENTIAL CIRCUIT **8 Hours**

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation –Application table – Edge triggering –Level Triggering –Realization of one flip flop using other flip flops – Register – shift registers - Universal shift register. Classification of sequential circuits- Moore and Mealy.

DESIGN OF SEQUENTIAL CIRCUITS **10 Hours**

Design of synchronous sequential circuits: state diagram- State table –State minimization – State assignment. Counters: Synchronous Binary counters – Modulo-n counter- Decade - BCD counters, Asynchronous counter, Ring counters. Hazards: Static – Dynamic.

DIGITAL LOGIC FAMILIES AND PLD **8 Hours**

Memories – ROM, PROM, EEPROM, RAM.– Programmable Logic Devices: Programmable Logic Array (PLA)- Programmable Array Logic (PAL)- Implementation of combinational logic using PROM, PLA and PAL. Introduction to FPGA. Digital logic families: TTL, ECL, CMOS.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. M. Morris Mano, Digital Design, 3rd Edition., Prentice Hall of India Pvt. Ltd., New Delhi, 2006
2. S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design",Second Edition, Vikas Publishing House Pvt. Ltd, New Delhi, 2004
3. Charles H.Roth. "Fundamentals of Logic Design", Thomson Publication Company, 2003.
4. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 5th Edition., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
5. Thomas L. Floyd, "Digital Fundamentals", Pearson Education, Inc, New Delhi, 2003
6. Donald D.Givone, "Digital Principles and Design", Tata Mc-Graw-Hill Publishing company limited, New Delhi, 2003.

U14ITT303 OBJECT ORIENTED PROGRAMMING WITH C++

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Compare the merits and demerits of object oriented programming over the structure programming
CO2: Develop solutions to a given problems using class object concepts
CO3: Make use of overloading and inheritance concepts to solve real world problems
CO4: Explain virtual and template concepts
CO5: Outline C++ streams and file manipulations

Pre-requisite :

1. U14CST201 - Structured Programming using C

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	W										
CO2	S	M			W							
CO3	S	M			W							
CO4	M	W										
CO5	M	W										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. Assignment 3. Seminar 4. Quiz	1. Course Exit Survey

INTRODUCTION 9 Hours

Object-Oriented Paradigm – Elements of Object Oriented Programming – Merits and Demerits of OO Methodology – C++ fundamentals – Data types – Operators and Expressions – Control flow – Arrays – Structures – Functions.

CLASSES AND OBJECTS 9 Hours

Classes and Objects – Passing objects as arguments – returning objects – Friend functions – Static data and member functions – Constructors –Parameterized constructor – Destructor – Copy constructor – Array of Objects – pointer to object members.

POLYMORPHISM AND INHERITANCE 10 Hours

Polymorphism – Function overloading – Unary operator overloading – binary operator overloading – Data Conversion – Overloading with Friend Functions – Inheritance –Derived class – Abstract Classes – Types of Inheritance

VIRTUAL FUNCTIONS AND TEMPLATES 8 Hours

Virtual functions – Need – Definition – Pure Virtual Functions – Virtual Destructors Template – Class template – Function Template.

FILES AND EXCEPTION HANDLING 9 Hours

C++ streams – console streams – console stream classes – formatted and unformatted console I/O operations – Manipulators File streams classes – File modes – File pointers and Manipulations – File I/O – Exception handling.

Theory:45 Hrs **Total Hours: 45**

REFERENCES

1. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", Second Edition, TMH, 2013.
2. Ira Pohl, “Object oriented programming using C++”, Pearson Education Asia, 2004
3. Bjarne Stroustrup, “The C++ programming language”, Addison Wesley, fourth edition,2014
4. John R.Hubbard, “Programming with C++”, Schaums outline series, TMH, 2003
5. E.Balagurusamy “Object Oriented Programming with C++”, 6th Edition, TMH 2/e,2013

U14ITT304 COMPUTER ARCHITECTURE

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Explain the organization and working of computer hardware components

CO2: Explain the hierarchical memory system, data transfer and communication between memory, processor and I/O

CO3: Demonstrate the operation of arithmetic unit

CO4: Examine the sequential and concurrent execution of instructions

Pre-requisite:

1. U14EET212 - Electrical and Electronic Circuits

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M	W										W
CO3	M	W										
CO4	M											

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment / Seminar	1. Course Exit Survey

BASIC STRUCTURE OF COMPUTERS **7+2 Hours**

Functional Units - Basic Operational Concepts - Bus Structures - Software Performance - Memory Locations and Addresses - Memory Operations - Instruction and Instruction Sequencing - Addressing Modes - Assembly Language - Basic I/O Operations - Stacks and Queues.

MEMORY SYSTEM **8+3 Hours**

Basic Concepts - Semiconductor RAM- ROM- Speed, Size and Cost - Cache Memories - Performance Considerations - Virtual Memory- Memory Management Requirements.

ARITHMETIC UNIT **11+5 Hours**

Addition and Subtraction of Signed Numbers - Design of Fast Adders - Multiplication of Positive Numbers - Signed Operand Multiplication and Fast Multiplication - Integer Division - Floating Point Numbers and Operations.

BASIC PROCESSING UNIT **10+3 Hours**

Fundamental Concepts - Execution of a Complete Instruction - Multiple Bus Organization - Hardwired Control – Microprogrammed Control – Microinstructions- Microprogram Sequencing-Wide-Branch Addressing-Microinstructions with Next-Address Field

PIPELINING AND I/O ORGANIZATION **9 +2 Hours**

Pipelining - Basic Concepts - Data Hazards - Instruction Hazards - Influence on Instruction Sets- Data path and Control considerations- Superscalar operation. Accessing I/O Devices - Interrupts - Direct Memory Access.

Theory: 45 Hrs Tutorial: 15 Hrs **Total Hours: 60**

REFERENCES

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", 5th Edition McGraw-Hill, 2002.
2. R.D.Dowsing, F.W.D.Woodhams and Ian Marshall, "Computers From Logic To Architecture", Mcgraw Hill Publishing Company, UK, 2000
3. Ian East, "Computer Architecture And Organization", Pitman Publishing, (A Division Of Longman Group UK Limited), Taylor & Francis E-Library, 2005
4. William Stallings, "Computer Organization and Architecture - Designing for Performance", 9th Edition, Prentice Hall, 2012.
5. David A.Patterson and John L.Hennessy, "Computer Organization and Design: The hardware / software interface", 4th Edition, Morgan Kaufmann, 2008.
6. John P.Hayes, "Computer Architecture and Organization", 3rd Edition, McGraw Hill, 2002.

U14GST001 ENVIRONMENTAL SCIENCE AND ENGINEERING

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Play an important role in transferring a healthy environment for future generations
CO2: Analyse the impact of engineering solutions in a global and societal context
CO3: Discuss contemporary issues that results in environmental degradation and would attempt to provide solutions to overcome those problems
CO4: Ability to consider issues of environment and sustainable development in his personal and professional undertakings
CO5: Highlight the importance of ecosystem and biodiversity
CO6: Paraphrase the importance of conservation of resources

Pre-requisite: Nil

CO/PO Mapping

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						S	S					
CO2						S	S					
CO3							M					
CO4						W	M	W				
CO5	M						M					
CO6						M	W					

Course Assessment methods:

Direct	Indirect
1. Internal tests 2. End Semester Exam 3. Assignment	Course exit survey

INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES — 10 Hours

Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects

on forests and tribal people – Water resources: Use and overutilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

ECOSYSTEMS AND BIODIVERSITY **14 Hours**

ECOSYSTEM : Concept of an ecosystem – Structure and function of an ecosystem: Producers, consumers and decomposers, Energy flow in the ecosystem, Food chains, food webs and ecological pyramids - Ecological succession – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) –

BIODIVERSITY : Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity – Bio geographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

ENVIRONMENTAL POLLUTION **8 Hours**

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 (g) Nuclear hazards – Solid waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

SOCIAL ISSUES AND THE ENVIRONMENT **7 Hours**

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Wasteland reclamation – Consumerism and waste products – Environment Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness

HUMAN POPULATION AND THE ENVIRONMENT **6 Hours**

Population growth, variation among nations – Population explosion – 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 – Case studies.

Field Work

Visit to local area to document environmental assets- river / grassland / hill / mountain, visit to local polluted site- urban / rural / industrial / agricultural, study of common plants, insects, birds, study of simple ecosystems-pond, river, hill slopes etc.,

Theory: 45 Hrs **Total Hours: 45**

REFERENCES

1. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co., 2013
2. Masters G.M., and Ela W.P., Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India., 2002
4. Trivedi R.K and Goel P.K., "Introduction to Air pollution" Techno-science Pubications. 2003
5. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media. 1996
6. Cunningham, W.P., Cooper, T.H.., & Gorhani E., Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001
7. Wager K.D., Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998
8. Townsend C., Harper J and Michael Begon, "Essentials of Ecology", Blackwell science Publishing Co., 2003
9. Syed Shabudeen, P.S. Environmental chemistry, Inder Publishers, Coimbatore. 2013

U14ITP301 DATA STRUCTURES AND ALGORITHMS LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes:

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

CO1: Demonstrate the usage of various linear data structures using simple applications.

CO2: Demonstrate the usage of various Non Linear data structures using simple applications.

CO3: Implement various sorting and searching Techniques.

Pre-requisite:

1. U14CSP201-Structured Programming Laboratory using C

CO/PO Mapping

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S										S
CO2	S	S										S
CO3	S	S										S

Course Assessment methods:

Direct	Indirect
1. Model Exam 2. End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

1. Array based implementation of stack and queue.
2. Linked list implementations and problems related to linked list such as inverting list, concatenation, etc.
3. Linked list based implementation of stack and queue
4. Problems related to applications of stack
5. Search Tree ADT - Binary Search Tree and traversal
6. AVL tree implementation
7. Implementation of Hash Tables
8. Implementation of graph traversal
9. Implementation of Dijkstra's algorithm
10. Implementation of minimum spanning tree algorithm
11. Sorting – Heap sort, Quick sort, Merge sort
12. Searching – Linear search, Binary search

Experiments beyond the syllabus should be conducted

Total Hours:30

U14ITP302 DIGITAL SYSTEMS AND DESIGN LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes:

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

CO1: Construct truth table for specific digital logic functionality

CO2: Simplify digital logic function using optimal minimization techniques.

CO3: Construct, analyze and troubleshoot the digital circuits.

CO4: Solve the real time problems related to digital circuits.

CO5: Simulate the designed digital circuits using VHDL.

Pre-requisite : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M								M		
CO2	M	W								M		
CO3	M	M								M	W	
CO4	M	M								M	M	
CO5	M	M								W	M	

Course Assessment methods:

Direct	Indirect
1. Model Exam 2. End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

1.Verification of Boolean theorems using digital logic gates

2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.

3. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices

4. Design and implementation of parity generator / checker using basic gates and MSI devices

5. Design and implementation of magnitude comparator

6. Design and implementation of application using multiplexers

7. Design and implementation of shift registers

8. Design and implementation of synchronous and asynchronous counters

9. Simulation study of any combinational and sequential circuit using VHDL.

Experiments beyond the syllabus should be conducted

Total Hours:30

U14ITP303 OBJECT ORIENTED PROGRAMMING LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1: Apply class components that protect data integrity and produce classes that are re-usable and maintainable

CO2: Test a C++ program for errors and exceptions

CO3: Construct a simple application using object oriented concepts

Pre-requisite:

1. **U14CSP201-** Structured Programming Laboratory using C

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M			M							
CO2	M	W			M							
CO3	S	M			S							

Course Assessment methods:

Direct	Indirect
1. Model Exam 2. End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

1. Simple class, objects and array of objects.
2. Function Overloading
3. Constructor, Destructor, Constructor Overloading
4. Unary and binary operator overloading
5. Inheritance, Data conversions
6. Static data and Static function
7. Virtual function and virtual base class
8. Class Templates, Function Templates
9. Exception handling
10. File operations

Experiments beyond the syllabus should be conducted

Total Hours:30

U14GHP301 **SOCIAL VALUES**

L	T	P	C
1	0	1	1

Course Outcomes :

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

CO1: Adopt and practice social values as his regular duties.

CO2: Take over the social responsibilities.

CO3: Give solutions and to manage the challenging social issues.

CO4: Voluntarily participate and organize social welfare programmes.

CO5: Explore his ideology of techno social issues and provide the best solution.

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							W	W		M		S
CO2								S		M		
CO3							W	M			W	
CO4								W	S	M		W
CO5							M	W				W

Course Assessment methods:

Direct	Indirect
1. Continuous Assessment 2. End Semester Examination	1. Attitude 2. Behavior

ORGIN OF SOCIETY **5 Hours**

Evolution of universe: Creation theory,Big bang theory, Evolution theory, Permanence theory - Mithya, Maya – Evolution of living being - Evolution of Man – Formation of society and social values.

Practical: Group Discussion on Evolution of Man and formation of society, Panel discussion on Social values - Pancha Bhoodha Navagraha Meditation.

SELF AND SOCIETY **2 Hours**

Duty to self, family, society and world –Realization of Duties and Responsibilities of individuals in the society (Five fold cultures) – impact of social media on present day youth and correction measures.

Practical: Case study – interaction with different professionals.

EDUCATION& SOCIETY **3 Hours**

Education: Ancient and Modern Models.

Practical: Making Short film on impact of education in social transformation.

DISPARITY AMONG HUMAN BEINGS **3 Hours**

Wealth's for humans, Factors leading to disparity in human beings and Remedies.

Practical: Debate on disparity and social values.

CONTRIBUTION OF SELF TO SOCIAL WELFARE **3 Hours**

Participation in Social welfare – Related programmes– Recognized association – Activities for social awareness – Programme by Government and NGOs – Benefits of social service – Balancing the family and social life.

Practical: In campus, off campus projects.

GENERAL PRACTICAL **14 Hours**

Ashtanga Yoga: Pathanjali maharishi & Yoga – Involvement – Rules of Asanas - Suryanamaskara (12 Steps)- Meditation.

Standing : Pada Hastasana, Ardha Cakrasana, Trikonasana, Virukchsana (Eka Padaasana)

Sitting : Padmasana, Vakrasana, Ustrasana, Paschimatanasana.

Prone : Uthanapathasana, Sarvangasana, Halasana, Cakrasana,

Supine : Salabhasana, Bhujangasana, Dhanurasana, Navukasana.

Theory: 16 Hrs Practical: 14 Hrs **Total Hours:30**

REFERENCES

1. Steven , Weinberg, "The First Three Minutes" : A Modern View of the Origin of the Universe (English), Perseus books group,1977.
2. Vethathiri's Maharishi's, "Vethathirian Principles of Life" The World Community Service Centre, Vethathiri Publications, 2003.
3. Vethathiri's Maharishi's, "Karma Yoga: The Holistic Unity" The World Community Service Centre, Vethathiri Publications, 1994.
4. Vethathiri's Maharishi's, "Prosperity of India" The World Community Service Centre, Vethathiri Publications, 1983.
5. Swami Vivekananda, "The Cultural Heritage of India" 1st edition, The Ramakirshna Mission Institute of Culture, 1937.
6. Vivekananda Kendra Prakashan Trust, "YOGA", Vivekanandha Kendra Prakashan Trust,Chennai, 1977.

SEMESTER IV

U14MAT402 SIGNALS AND SYSTEMS

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Apply laws of Physics to model simple real life systems to predict its dynamic behavior

CO2: Use Fourier analysis to identify the frequency characteristics of signals of interest

CO3: Use time domain and frequency domain methods to understand the inherent behavior of LTI systems

CO4: Take up advanced courses on system dynamics, digital signal processing and design of feedback control systems

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S									
CO2	M	M	M									
CO3	S	M		M								
CO4	S	S	M		S							

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment	1. Matlab exercise

REPRESENTATION OF SIGNALS AND SYSTEMS **9 +3 Hours**

Introduction to systems, signals and their interaction. Continuous time and discrete time signals, periodic and aperiodic signals, energy and power signals. Representation of simple systems with examples. Linear and nonlinear systems, Systems with and without memory, Time varying and time- invariant systems

DYNAMIC SYSTEM MODELING AND SIMULATION **9+3 Hours**

Lumped element modeling - Laws of Physics applied to Simple Mechanical Systems and RLC Electrical circuits. System State - State variables and forms of state equations. Matrix representation of state equations for linear dynamic systems – Free response and forced response

Time response from general system models through numerical integration. Use of Continuous System Simulation Tools (MATLAB)

PERIODIC SIGNALS AND FOURIER SERIES **9+3 Hours**

Obtaining trigonometric Fourier series – Exponential Fourier Series –Fourier Spectra – Parseval's Theorem- Linearity and time-shifting properties of Fourier Series

FOURIER TRANSFORMS FOR APERIODIC SIGNALS **9+3 Hours**

Fourier Transform(FT) pair and equations relating them – Magnitude and phase spectra from Fourier Transforms – Linearity, time scaling , time shifting, time differentiation and integration properties of FTs - Parseval's Energy Theorem – Existence condition for FT

ANALYSIS OF LINEAR TIME INVARIANT SYSTEMS USING TRANSFORMS **9+3 Hours**

Impulse Response of LTI system- Convolution integral – FT for convolved time signals - Transfer function of LTI system using Fourier Transform – System gain and phase responses in sinusoidal steady state – Bode plots – Applications in Communication and Control – Analog filters

Theory: 45 Hrs Practical: 15 Hrs **Total Hours:60**

REFERENCES

1. Mrinal Mandal and Amrit Asif, `Continuous and Discrete Time Signals and Systems', Cambridge University Press, 2007
2. P.D. Cha, J.J. Rosenberg & C.L. Dym, `Fundamentals of Modeling and Analyzing Engineering Systems', Cambridge University Press, 2000

3 W.Y. Yang et. al., `Signals and Systems with MATLAB', Springer, 2009

4 A.V. Oppenheim & A.S. Willsky, `Signals & Systems', PHI Learning Pvt.Ltd.,2011

5 V. Krishnaveni & A. Rajeshwari, `Signals & Systems',Wiley – India, 2012.

U14ITT401 **MICROPROCESSORS AND MICROCONTROLLER**

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Identify the basic functions and explain the instruction set of 8085 microprocessor

CO2: Make use of the instruction set of 8085 microprocessor and develop assembly code to solve problems.

CO3: Illustrate functions of various general purpose interfacing devices.

CO4: Develop skills related to programming of 8086 processor and development tools

CO5: Compare the architecture and instruction set of 8086 and 8085 processor with 8051 microcontroller.

Pre-requisite :

1. U14ITT302-Digital Systems and Design

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
CO2	S	M	M									W
CO3	M	M										
CO4	M	M	W									W
CO5	M	M										W

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

THE 8085 MICROPROCESSOR **9+4 Hours**

Introduction to 8085 - Microprocessor architecture and its operations –8085 MPU - Example of a 8085 based Microcomputer - Instruction set- Addressing modes- Timing diagram of 8085 (Opcode fetch, Memory Read/Write, I/O Read/Write).

PROGRAMMING THE 8085 **9+5 Hours**

Programming techniques –Counters – Time Delays – Stack and Subroutines – Code conversion – BCD Arithmetic - Interrupts- Memory and I/O interfacing.

GENERAL PURPOSE INTERFACING DEVICES **9+2 Hours**

8255A Programmable Peripheral Interface - IC 8251A Serial Communication Interface – 8253 Programmable Interval Timer IC - IC 8279 Programmable Keyboard /Display Interface – 8259A Programmable Interrupt Controller.

8086 MICROPROCESSOR **10+2 Hours**

Intel 8086 microprocessor - Architecture - Instruction set - Addressing modes – Assembly language programming – Procedures. Interrupts and interrupt service routines- Basic 8086/8088 Configurations: Minimum Mode and Maximum Mode

8051 MICROCONTROLLER **8+2 Hours**

Architecture of 8051 Microcontroller – signals – I/O ports – memory – counters and timers – serial data I/O – interrupts – Applications

Theory: 45 Hrs Tutorial: 15 Hrs **Total Hours:60**

REFERENCES

1. Ramesh S.Gaonkar, "Microprocessor - Architecture, Programming and Applications with the 8085", Sixth Edition, Penram International Publishing Private Limited, 2014.
2. Yn-cheng Liu,Glenn A.Gibson, "Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design", second edition, Prentice Hall of India , 2006.
3. Kenneth J.Ayala, 'The 8051 microcontroller Architecture, Programming and applications' Third edition, Penram international 2004.
4. Douglas V.Hall, "Microprocessors and Interfacing: Programming and Hardware", Revised Second edition, TMH, 2006.
5. Krishna Kant, "Microprocessors and Microcontrollers: Architecture, Programming and System Design 8085, 8086, 8051, 8096, Prentice Hall of India Pvt. Ltd., 2012.

U14ITT402 DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Explain the architecture of Database Management Systems

CO2: Explain the basic concepts of data models and database languages

CO3: Explain the basic concepts of query processing, transaction and storage management

CO4: Construct a database for a given problem.

CO5: Explain the basic concepts of distributed databases, XML and Database Security.

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M											
CO3	M											
CO4	S	S			W							W
CO5	M											

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INTRODUCTION 9 Hours

Database system Architecture - Relational Databases-Formal Relational Query Languages-Introduction to SQL

DATABASE DESIGN 9 Hours

Advanced SQL: Accessing SQL from a Programming Languages-Functions and Procedures-Triggers.

Database Design and E-R Model: Overview-Entity Relationship Model-Constraints-Removing Redundant Attributes in Entity Sets-E-R Diagrams

Relational Database Design –Normalization- Features of Good Relational Database Design –

Informal Guide Lines For Relational Schemas- Decomposition Using Functional Dependencies-Functional Dependency Theory-First, Second, Third And Boyce Codd Normal Forms.

DATA STORAGE AND QUERYING 9 Hours

Data Storage: Overview of Physical Storage Media-RAID-File Organization-Organization of Records in Files-Data Dictionary Storage.

Data Indexing and Hashing: Basic Concepts-Ordered Indices-B+ Tree Index Files-Multiple Key Access-Static and Dynamic Hashing.

Query Processing: Overview-Measures of Query Cost-Selection, Sorting and Join Operations-Other Operations-Evaluations of Expressions.

TRANSACTION MANAGEMENT 9 Hours

Transaction Management: Transaction Concept-Transaction Model-Transaction Atomicity, Durability and Isolation-Serializability

Concurrency Control: Lock Based Protocols-Time Stamped Based Protocols-Deadlock Handling

Recovery System: Failure Classification-Storage-Log Based Recovery-Shadow Paging

ADVANCED TOPICS 9 Hours

Distributed Databases – Homogeneous and Heterogeneous Databases – Distributed Data Storage – Distributed Transactions – Commit Protocols- concurrency control

XML-Structure-Document Schema- Querying and Transformation-Storage of XML data

Database Security- Issues-Granting and Revoking Privileges-Encryption and Public Key Infra Structure.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Abraham Silberschatz, Henry Korth, and S. Sudarshan, "Database System Concepts", Sixth edition, McGraw-Hill.2011.
2. R. Elmasri and S. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson Education,2011
3. Thomas M. Connolly and Carolyn E. Begg, "Database Systems - A Practical Approach to Design, Implementation, and Management", fifth edition, Pearson Education, 2010.
4. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

U14ITT403 USER INTERFACE DESIGN

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Describe Human Computer Interaction

CO2: Articulate and apply common design principles

CO3: Create effective instructions for test users

CO4: Identify cognitive mechanisms

CO5: Outline the design process, both in oral and written form

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M									W		
CO2	M	W										
CO3	M	W										
CO4	M	W										
CO5	M	M			W					S		

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar 5.Project-User Interface Design for any application	1. Course Exit Survey

INTRODUCTION 8 Hours

Introduction – Importance – Human - Computer interface - characteristics of graphics interface -Direct manipulation graphical system - web user interface - popularity characteristic & principles.

USER INTERFACE DESIGN PROCESS **10 Hours**

User interface design process – obstacles – usability - human characteristics in design - Human interaction speed - business functions - requirement analysis – Direct - Indirect methods - basic business functions - Design standards - system timings – Human consideration in screen design - structures of menus - functions of menus - contents of menu - formatting - phrasing the menu - selecting menu choice- navigating menus – graphical menus.

WINDOWS CHARACTERISTICS **9 Hours**

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.

GUIDELINES AND FEEDBACK **9 Hours**

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

WINDOWS LAYOUT **9 Hours**

Windows layout - test: prototypes - kinds of tests - retest - Information search - visualization - Hypermedia - www - Software tools.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Wilbent. O. Galitz ,"The Essential Guide To User Interface Design", John Wiley& Sons, Third Edition .
2. Ben Sheiderman, "Design - The User Interface", Fourth Edition, Pearson Education, 2009.
3. Alan Cooper, "The Essential of User Interface Design", Wiley - Dream Tech Ltd., 2014.

U14ITT404 DESIGN AND ANALYSIS OF ALGORITHMS

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Explain the fundamentals of analysis of algorithm

CO2: Explain mathematical analysis for recursive and non-recursive Algorithms

CO3: Identify and Develop algorithms for real life problems using different design techniques

CO4: Analyze the efficiency of various algorithms

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M											W
CO3	M	W		W								W
CO4	S	S		S								M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INTRODUCTION **9+3 Hours**

Notion of Algorithm - Fundamentals of Algorithmic Problem Solving - Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency: Analysis Framework - Asymptotic Notations and Basic Efficiency Classes.

ALGORITHM ANALYSIS **9 +3Hours**

Mathematical Analysis of Non-recursive Algorithms - Mathematical Analysis of Recursive Algorithms - Fibonacci Numbers- Empirical Analysis of Algorithms - Algorithm Visualization.

ALGORITHM DESIGN METHODS 9 +3Hours

Brute Force Method: Selection Sort and Bubble Sort - Sequential Search and Brute-Force string matching-closest pair problem-Exhaustive search.

Divide and Conquer Method: Merge Sort - Multiplication of large integers-Strassen's Matrix Multiplication- closest pair problem and Convex Hull Problem

Decrease and Conquer Method: Josephus Problem.

Transform and Conquer Method: Presorting

ALGORITHM DESIGN METHODS 10+3Hours

Dynamic Programming: Warshall's and Floyd's Algorithm - Optimal Binary Search Trees-0/1 knapsack using dynamic programming – Travelling salesperson problem

Greedy Technique: General Method – Knapsack problem – Job sequencing with deadlines - Optimal storage on tapes –Huffman trees.

8+3 Hours

ALGORITHM DESIGN METHODS

Backtracking: N-Queen's Problem - Hamiltonian Circuit Problem - Subset-Sum Problem.- Graph coloring.

Branch and Bound: Assignment Problem - Knapsack Problem - Traveling Salesman Problem.

Theory: 45 Hrs Tutorial: 15 Hrs Total Hours:60

REFERENCES

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education Asia, 2008.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, Hyderabad, 2008.
3. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India,New Delhi, 2007
4. Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", Pearson Education Asia, 2003.
5. A.V.Aho, J.E. Hopcroft and J.D.Ullman, "The Design and Analysis of Computer Algorithms",Pearson Education Asia, 2003

U14GST007 PROFESSIONAL ETHICS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Understand the ethical theories and concepts

CO2: Understanding an engineer's work in the context of its impact on society

CO3: Understand and analyze the concepts of safety and risk

CO4: Understand the professional responsibilities and rights of Engineers

CO5: Understand the concepts of ethics in the global context

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								M				
CO2							M	M	M			
CO3						M						
CO4							M	M	M			
CO5									M			

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

ENGINEERING ETHICS AND THEORIES **9 Hours**

Definition, Moral issues, Types of inquiry, Morality and issues of morality, Kohlberg and Gilligan's theories, consensus and controversy, Professional and professionalism, moral reasoning and ethical theories, virtues, professional responsibility, integrity, self respect, duty ethics, ethical rights, self interest, egos, moral obligations.

SOCIAL ETHICS AND ENGINEERING AS SOCIAL EXPERIMENTATION — 9 Hours

Engineering as social experimentation, codes of ethics, Legal aspects of social ethics, the challenger case study, Engineers duty to society and environment.

SAFETY — 9 Hours

Safety and risk – assessment of safety and risk – risk benefit analysis and reducing risk – the Three Mile Island and Chernobyl case studies. Bhopal gas tragedy.

RESPONSIBILITIES AND RIGHTS OF ENGINEERS — 9 Hours

Collegiality and loyalty – respect for authority – collective bargaining – confidentiality – conflicts of interest – occupational crime – professional rights – employee rights – Intellectual Property Rights (IPR) – discrimination.

GLOBAL ISSUES AND ENGINEERS AS MANAGERS, CONSULTANTS AND LEADERS — 9 Hours

Multinational Corporations – Environmental ethics – computer ethics – weapons development – engineers as managers – consulting engineers – engineers as expert witnesses and advisors – moral leadership – Engineers as trend setters for global values.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”. (2005) McGraw-Hill, New York.
2. John R. Boatright, “Ethics and the Conduct of Business”, (2003) Pearson Education, New Delhi.
3. Bhaskar S. “Professional Ethics and Human Values”, (2005) Anuradha Agencies, Chennai.
4. Charles D. Fleddermann, “Engineering Ethics”, 2004 (Indian Reprint) Pearson Education / Prentice Hall, New Jersey.
5. Charles E. Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and cases”, 2000 (Indian Reprint now available) Wadsworth Thompson Learning, United States.

U14ITP401 MICROPROCESSORS LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1: Develop assembly language program for 8085 to solve simple programs.

CO2: Make use of interfacing devices for a specified application.

CO3: Develop assembly language program for 8086 using BIOS/DOS Calls.

CO4: Develop simple real time applications using 8085 and 8086 processor.

Pre-requisite:

1. U14ITP302-Digital Systems and Design Lab

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M								W		
CO2	M	W								W		
CO3	M	M	M							M		
CO4	S	M								W		

Course Assessment methods:

Direct	Indirect
1. Model Exam 2. End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

Programming with 8085

1. Programs using loops.
2. Programs using counting.
3. Arranging the set of numbers in ascending order.
4. Code conversion - Binary to BCD and BCD to Binary.
5. Interfacing 8255.
6. Interfacing 8279.
7. Stepper Motor Controller.
8. Mini Project

Programming with 8086

9. String concatenation.
10. Find and replace operation in a string.
11. Keyboard and Screen Processing using BIOS/DOS Calls.

Experiments beyond the syllabus should be conducted

Total Hours:30

U14ITP402 DATABASE MANAGEMENT SYSTEMS LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1: Design a simple database application using E-R Model.

CO2: Develop a database using RDBMS

Pre-requisite:

1. U14CSP201-Structured Programming Laboratory using C

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S										S
CO2	S	S			M					W		S

Course Assessment methods:

Direct	Indirect
1.Mid Model Tests 2. End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

1. DDL and DML commands
2. Transaction control commands and aggregate functions
3. Joins and Nested Queries
4. Constraints and Views
5. High level programming language extensions (Control structures, Procedures and Functions).
6. Cursors and Triggers
7. Embedded SQL
8. Database Design and implementation with any one front end tool (Mini Project)

SAMPLE LIST OF PROJECTS

1. Hospital management
2. Railway ticket reservation
3. Student Mark list processing
4. Employee payroll processing
5. Inventory control

Experiments beyond the syllabus should be conducted

Total Hours:30

U14ENP401 COMMUNICATION SKILLS LABORATORY
(Common to all branches of Engineering and Technology)

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1: Imparting the role of communicative ability as one of the softskills needed for placement

CO2: Developing communicative ability and softskills needed for placement

CO3: Making students Industry-Ready through inculcating team-playing capacity

Pre-requisite:

1. U14ENT101 / Functional English I
2. U14ENT201 / Functional English II

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				M							M	
CO2				W						M	S	
CO3				S						W	S	

Course Assessment methods:

Direct	Indirect
1.Presentation 2.Role Play 3. Mock interview 4. Group Discussion	

GRAMMAR IN COMMUNICATION **9 Hours**

Grammar and Usage – Building Blocks, Homonyms, Subject and Verb Agreement, Error Correction - Grammar Application, Framing Questions – Question words, Verbal Questions, Tags, Giving Replies –Types of Sentences, Listening Comprehension –Listening and Ear training.

ASSERTIVE COMMUNICATION 9 Hours

Listening Comprehension in Cross–Cultural Ambience, Telephonic Conversations/Etiquette, Role Play Activities, Dramatizing Situations- Extempore – Idioms and Phrases.

CORPORATE COMMUNICATION 9 Hours

Video Sensitizing, Communicative Courtesy – Interactions – Situational Conversations, Time Management, Stress Management Techniques, Verbal Reasoning, Current Affairs – E Mail Communication / Etiquette.

PUBLIC SPEAKING 9 Hours

Giving Seminars and Presentations, Nuances of Addressing a Gathering - one to one/ one to a few/ one to many, Communication Process, Visual Aids & their Preparation, Accent Neutralization, Analyzing the Audience, Nonverbal Communication.

INTERVIEW & GD TECHNIQUES 9 Hours

Importance of Body Language –Gestures & Postures and Proxemics, Extempore, Facing the Interview Panel, Interview FAQs, Psychometric Tests and Stress Interviews, Introduction to GD, Mock GD Practices.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Bhatnagar R.P. & Rahul Bhargava, "English for Competitive Examinations", Macmillian Publishers, India, 1989, ISBN: 9780333925591
2. Devadoss K. & Malathy P., "Career Skills for Engineers", National Book Publishers, Chennai, 2014.
3. Aggarwal R.S., "A Modern Approach to Verbal & Non–Verbal Reasoning", S.Chand Publishers, India, 2012, ISBN : 8121905516

U14GHP401 NATIONAL AND GLOBAL VALUES

L	T	P	C
1	0	1	1

(Common to all branches of Engineering and Technology)

Course Outcomes :

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

CO1: Act as a good and responsible citizen.

CO2: Conserve and protect eco cycle.

CO3: Voluntarily work with global welfare organization and provide solution for global peace.

CO4: Invent his Technical design by considering humanity and nature.

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							M	S		M		S
CO2							S					
CO3							W	M	M	M		
CO4							S	S			S	

Course Assessment methods:

Direct	Indirect
1. Continuous Assessment 2. End Semester Examination	1. Attitude 2. Behavior

ROLE OF A RESPONSIBLE CITIZEN **4 Hours**

Citizen - its significance–National and Global perspectives.

Practical: Group discussion on National and Global values.

GREATNESS OF INDIAN CULTURE **2 Hours**

Emerging India – past and present, about Culture, Morality and spirituality– Beauty of Unity in diversity - Impact of western culture in India and Indian culture over other countries.

Practical: Demonstration and impact measurements of simple and good actions.

GLOBAL WELFARE ORGANISATIONS **2 Hours**

Education – Health – Nature – Peace

Practical: Organizing an event linking with one of the Organizations In campus /off campus.

PRESERVING NATURE **2 Hours**

Appreciating the flora and fauna on Earth - Importance ofEcological balance – Conservation.
Practical: Trekking, field visit.

GLOBAL PEACE **4 Hours**

One World and One Humanity - Global Peace.
Global personalities: Thiruvalluvar, Vallalar, Vivekanadar, Mahatma Gandhi,Vethathiri Maharishi – Plans for world peace.
Practical: Group discussion on individual plans for world peace.

GENERAL PRACTICAL **16 Hours**

Simplified physical Exercise – Kayakalpa practice (Follow up practice) – Meditatyion - Theory & Practice
Pranayama : Bhastrika, Kapala Bhati, Nadi suddhi, Sikari, Sitali.
Mudhra : Chin Mudhra, Vayu Mudhra, Shunya Mudhra, Prithvi Mudhra, Surya Mudhra, Varuna Mudhra, Prana Mudhra, Apana Mudhra, Apana Vayu Mudhra, Linga Mudhra, Adhi Mudhra, Aswini Mudhra.

Theory: 14 Hrs Tutorial: 16 Hrs Total Hours: 30

REFERENCES

1. Drunvalo Melchizedek, "The Ancient Secret of the Flower of Life", Vol. 1, Light Technology Publishing; First Edition edition (April 1, 1999)
2. Dr.M. B. Gurusamy, "Globalisation – Gandhian Approach" Kumarappa Research Institution, 2001.
3. Vethathiri's Maharishi's, **"**Karma Yoga: The Holistic Unity" The World Community Service Centre, Vethathiri Publications, 1994.
4. Vethathiri's Maharishi's, "World peace" The World Community Service Centre, Vethathiri Publications,1957.
5. Vethathiri's Maharishi's, "Atomic Poison" The World Community Service Centre, Vethathiri Publications, 1983.
6. Vethathiri's Maharishi's, "The World Order Of Holistic Unity" The World Community Service Centre, Vethathiri Publications, 2003.
7. Swami Vivekananda, "What Religion Is" 41st edition, The Ramakrishna Mission Institute of Culture, 2009.

SEMESTER V

U14MAT506 PROBABILITY AND QUEUEING THEORY

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Analyze random or unpredictable experiments and investigate important features of random experiments

CO2: Construct probabilistic models for observed phenomena through distributions which play an important role in many engineering applications

CO3: Associate random variables by designing joint distributions and correlate the random variables.

CO4: Know about random processes, in particular about Markov chains which have applications in engineering.

CO5: Identify the queuing model in the given system, find the performance measures and analyze the result

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S								
CO2	S	M	M									
CO3	S	S		S								
CO4	S	S	M		S							
CO5		S	S	S								

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	Course Exit Survey

PROBABILITY

9+3 Hours

Probability – Axioms of Probability – Addition Theorem – Conditional Probability - Multiplication Theorem – Posterior Probability – Baye's Theorem

RANDOM VARIABLES **5+2 Hours**

Discrete and continuous random variables – Moments – Moment generating functions and their properties – Binomial – Poisson – Exponential and Normal distributions.

JOINT DISTRIBUTIONS **4+1 Hours**

Marginal and conditional distributions – Correlation and Regression

RANDOM PROCESSES AND MARKOV CHAINS **9+3 Hours**

Classification – Stationary process – Markov process – Markov chains – Transition probabilities - Limiting distributions – Poisson process.

MARKOVIAN QUEUES **9+3 Hours**

Markovian models – Birth and death queueing models – Steady state results – Single and Multiple server Queueing models – Queues with finite waiting rooms – Finite source models – Little's formula. (Derivations excluded)

NON–MARKOVIAN QUEUES AND QUEUE NETWORKS **9+3 Hours**

M/G/1 Queue – Pollaczek – Khintchine formula – Series queues – Open and Closed Networks.

Theory: 45 Hrs Tutorial: 15 Hrs **Total Hours:60**

REFERENCES

1. O.C. Ibe, "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2009.
2. D. Gross and C.M. Harris, "Fundamentals of Queueing Theory", Wiley Student edition, 2004.
3. A.O. Allen, "Probability, Statistics and Queueing Theory with Computer Applications", Elsevier, 2nd edition, 2005.
4. H.A. Taha, "Operations Research", Pearson Education, Asia, 8th edition, 2007.
5. K.S. Trivedi, "Probability and Statistics with Reliability, Queueing and Computer Science Applications", John Wiley and Sons, 2nd edition, 2002.

U14ITT501 OPERATING SYSTEMS

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Illustrate the operating system concepts and its functionalities.

CO2: Compare various CPU scheduling algorithms

CO3: Explain the need for process synchronization.

CO4: Identify the issues in memory management

CO5: Compare file and disk management strategies

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M	M	W									M
CO3	M	W										
CO4	M	W										M
CO5	M	W										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment	1. Course Exit Survey

INTRODUCTION 7 Hours

Introduction: Operating System Structure – Operating System Operations – Process Management – Memory Management – Storage Management – Protection and Security – Distributed Systems – Computing Environments – System Structures: Operating System Services – User Operating System Interface – System Calls – Types of System Calls – System Programs – **Process Concept**: Process Scheduling – Operations on Processes – Inter-process Communication.

PROCESS MANAGEMENT AND COORDINATION 10+4Hours

Multithreaded Programming: Overview – Multithreading Models – Threading Issues – **Process Scheduling**: Basic Concepts – Scheduling Criteria – Scheduling Algorithms –

Multiple-Processor Scheduling – Synchronization – The Critical-Section Problem – Peterson's Solution – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Monitors.

DEADLOCKS AND MEMORY MANAGEMENT **10+5Hours**

Deadlocks: System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock
Memory Management Strategies: Swapping – Contiguous Memory Allocation – Paging – Structure of the Page Table – Segmentation.

VIRTUAL MEMORY MANAGEMENT **9+3 Hours**

Virtual Memory Management: Demand Paging – Copy on Write – Page Replacement – Allocation of Frames – Thrashing.
File System: File Concept – Access Methods – Directory Structure – File Sharing – Protection.

STORAGE MANAGEMENT **9+3 Hours**

Implementing File Systems: File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management
Secondary Storage Structure: Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management. Devices – Device controllers- Device drivers. **Case Study**: Linux system.

Theory: 45 Hrs Tutorial: 15 Hrs **Total Hours:60**

REFERENCES

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Principles", John Wiley & Sons (Asia) Pvt. Ltd, Seventh Edition, 2009.
2. Gary Nutt, "Operating Systems- A Modern Perspective", Pearson Education Pvt. Ltd, Second Edition, 2002.
3. Andrew S. Tanenbaum, "Modern Operating Systems", 3rd edition Prentice Hall of India Pvt. Ltd, 2010.
4. Harvey M. Deitel, "Operating Systems", Pearson Education Pvt. Ltd, Second Edition, 2002.
5. William Stallings, "Operating System", Pearson Education, Sixth edition, 2012.

U14ITT502 SOFTWARE ENGINEERING

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Compare various software development models.

CO2: Translate end-user requirements into system requirements.

CO3: Explain the importance of SQA, testing and cost estimation

CO4: Identify software project planning and management activities

CO5: Develop a simple automated system following software engineering principles

Pre-requisite :

1. U14ITT402 – Data Base Management Systems

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	W										
CO2	M	W										
CO3	M	W										
CO4	M	W									M	
CO5	S	M								W		W

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar 5.Project-Developing any application software	1. Course Exit Survey

INTRODUCTION 9 Hours

Expanding roles for computers, the place of Software, Software Engineering Discipline, Computer Based Systems, Increasing size and scope of software, Generic vs. Custom-made software products-distinctive characteristics of software products.

Software Development Models: Life cycle models-Linear Sequential, Evolutionary, Unified models, Agile development approach.

REQUIREMENTS ENGINEERING 9 Hours

Classification of Requirements-System Requirements and Software Requirements, Functional and Non-Functional requirements, Requirement Engineering Tasks.

System Models: Domain Analysis and Modeling, Data Models, Functional Models-structured Analysis Model, Object Oriented Models- Cloud, State, Use Case Models, Sequence and activity diagrams, Relationship among the Object Oriented Models, Building Object Oriented Analysis Models

SOFTWARE DESIGN AND IMPLEMENTATION 9 Hours

Architectural Design-Decomposition strategy, Partitions and Layers, Structured System Design-Use of Heuristics for Design Refinements, Object-Oriented Design- User Interface Design-,. Reusable Components, Patterns, Frame works, Coding – Choice of Programming Language, Coding Standards

SOFTWARE TESTING 9 Hours

Software Testing: Conventional Testing and SDLC Testing, Formal Technical Reviews, Walkthroughs, Inspections, Black-Box vs. Glass-Box Testing, Testing Strategies , Testing-Quality Dimensions, Process Quality and Product Quality, Quality Assurance Planning, Quality Measurements, Software Configuration Management.

SOFTWARE PROJECT MANAGEMENT 9 Hours

Software Projects, Project Feasibility Study, Project Planning, Project Organization, Estimation of Project Effort-Measuring Software Attributes and Productivity, COCOMO for Effort Estimation. Risk Management. Project Scheduling, Project Monitoring and Control-Assessment of Project Progress, Measurement during Software Projects.

Software Maintenance: Planning for Maintenance, maintenance Activities, Reengineering

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. R.S. Pressman, "Software Engineering – A Practitioner's Approach", Eighth edition, McGraw Hill International Edition, 2014.
2. S. Thangasamy, "Essentials of Software Engineering", Wiley India, First Edition, 2012
3. Stephen Schach, "Software Engineering", Seventh edition, TMH, New Delhi, 2007.
4. Pankaj Jalote, "An Integrated Approach to Software Engineering", Third edition, Narosa Publishing House, 2005.
5. M. Blaha and J. Rumbaugh, "Object Oriented Modeling and Design with UML", Second edition, Prentice-Hall India, 2006.
6. I Sommerville, "Software Engineering", Seventh edition, Pearson Education, 2004

U14ITT503 JAVA PROGRAMMING

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Compare and contrast the object oriented features of Java and C++.

CO2: Explain the features of exception handling, threads & util package in Java.

CO3: Explain the communication between client & server using sockets and database connectivity.

CO4: Build applications that include GUIs and event driven programming using swings

CO5: Develop programs using core concepts of Java and test it for errors & exceptions

Pre-requisite:

1. U14ITT303-Object Oriented Programming and C++

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										
CO2	M											
CO3	M											
CO4	M	M										M
CO5	S	S										M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4.Seminar	1. Course Exit Survey

JAVA FUNDAMENTALS I — 9 Hours

Java Fundamentals – Control Structures – Classes – Methods - Garbage Collection – Inheritance-Packages

JAVA FUNDAMENTALS II — 9 Hours

Interfaces – Exception Handling - String Handling –Enumerations –Type Wrappers-Autoboxing- Generics

THREADS AND PACKAGES **9 Hours**

Thread model - Life Cycle – Synchronization - Inter-thread Communication- File class – Stream classes – Util package: Collection Interfaces – Collection classes.

JDBC AND NETWORKING **9 Hours**

Creating and Manipulating database-Row Set Interface-Prepared Statements-Stored Procedures-Transaction Processing. Manipulating URLS-TCP/IP Sockets-Datagrams.

GUI COMPONENTS **9 Hours**

Introduction-Swing Components: JButton-JTextField-JRadioButton-JcheckBox-JComboBox-JList-JPanel-JTextArea-Adapter classes-Event handling-Layout Managers

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Herbert Schildt, "The Complete Reference– Java", Tata McGraw Hill, 9th Edition,2014
2. Deitel and Deitel, "Java: How to Program", Prentice Hall, 10th Edition,2014
3. Bruce Eckel , "Thinking in Java", Fourth Edition, Pearson Education, 2006
4. Cay S. Horstmann, Gary Cornell, "Core Java, Volume I—Fundamentals", Eighth Edition, Sun Microsystems,2011.
5. Cay S. Horstmann , "Core Java, Volume II—Advanced Features", Eighth Edition, Sun Microsystems
6. Ying Bai "Practical Database Programming with Java", Wiley Publication, 2011.
7. Marc Loy, Robert Eckstein, Dave Wood, James Elliott, Brian Cole, " Java Swing", Second Edition,2012

U14ITT504 COMPUTER NETWORKS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Explain the functionality of each layer of OSI reference model.

CO2: Explain the protocols operating in each layer of OSI model.

CO3: Describe IP routing concepts, operation of routing protocols, and construction of routing tables

CO4: Identify network topology and IP address.

CO5: Summarize Internet congestion control mechanisms.

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M							M				M
CO2	M											M
CO3	M											
CO4		S										M
CO5	M	M										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

DATA COMMUNICATIONS 6 Hours

Data Communication- Networks-The OSI Model- Layers in the OSI Model – TCP/IP Protocol Suite – Addressing – Transmission Media- Network Topology.

DATA LINK LAYER 10 Hours

Link and Medium Access protocols – Framing – Error Detection – Reliable Transmission – IEEE Standards - Ethernet – Token Rings – FDDI –IEEE 802.11 protocol.

NETWORK LAYER 10 Hours

Circuit Switching – Packet Switching – Switching and Forwarding – Bridges and LAN Switches – Cell Switching – Internetworking – IPV4- Routing Techniques: Distance Vector – Link state – Subnetting – CIDR - IPV6.

TRANSPORT LAYER 10 Hours

UDP – TCP – Congestion Control and Resource Allocation –TCP Congestion Control – Congestion Avoidance Mechanisms – Quality of Service- Integrated Services – Differentiated Services.

APPLICATION LAYER 9 Hours

Domain Name System – Electronic Mail – File Transfer- WWW and HTTP - Network Management System – Simple Network Management Protocol.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. William Stallings, "Data and Computer Communications", Eighth Edition, Pearson Education, 2011.
2. Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw-Hill, Fifth Edition, 2012.
3. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers Inc., 2011.
4. James F. Kurose, Keith W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet", Sixth Edition, Pearson Education, 2012.
5. Nader F. Mir, "Computer and Communication Networks", First Edition, Pearson Education, 2007.
6. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, "Computer Networks: An Open Source Approach ", McGraw Hill Publisher, 2011.

U14ECT511 DIGITAL SIGNAL PROCESSING

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Understand and analyze the characteristics of discrete signals and systems

CO2: Apply mathematical tools for signal / system analysis

CO3: Design digital filters.

CO4: Learn the architecture and features of P-DSPs

Pre-requisite:

1. U14MAT402 – Signals and Systems

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
	M	M	M									
	M	M	M									M
	M	M										M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

DISCRETE TIME SIGNALS AND SYSTEMS 12Hours

Representation of a CT signal by samples – Sampling theorem – Reconstruction of a signal from its samples – Aliasing – DT Signals – Impulse, Step, Pulse, Sine, Exponential – Properties of DT signals - Transformation of independent variable – Shifting, scaling, folding - Discrete Time LTI systems – Properties – Impulse response – Convolution sum – Properties of Convolution

Z-TRANSFORM AND SYSTEM ANALYSIS 12Hours

DTFT – Properties - Z transform – Forward Transform - Inverse Transform using Partial Fractions - Properties – Pole-Zero plot – Difference Equations - Transfer function - Analysis of Discrete Time systems using DTFT and Z Transform.

DISCRETE FOURIER TRANSFORM **12Hours**

Introduction to DFT– Properties of DFT – Efficient computation of DFT – FFT algorithms – Introduction to Radix-n algorithms - Radix-2 FFT – Decimation-in-Time and Decimation–in-Frequency algorithms – Butterfly diagram.

DESIGN OF DIGITAL FILTERS **12Hours**

FIR filter design: Linear phase characteristics - Windowing Technique –Rectangular, Hamming, Hanning, Blackmann windows – IIR filter design: Analog filter design - Butterworth and Chebyshev approximations – Impulse invariance and Bilinear transformations - FIR and IIR filter structures – Direct form I and II - cascade and parallel forms – Finite Precision effects.

ADVANCED TOPICS AND PROGRAMMABLE DSP CHIPS **12Hours**

Concepts of multi-rate signal processing – Decimation and interpolation by integer factor – Sampling rate conversion – Introduction to DSP architecture - Von Neumann, Harvard, Modified Harvard architectures - MAC unit – Multiple ALUs Modified Bus structures and memory access schemes in P-DSP – Multiple access memory – Multi-ported memory – VLIW architecture - Pipelining – Special addressing modes

Theory: 45Hrs Tutorial: 15Hr **Total Hours: 60**

REFERENCES

1. Mrinal Mandel and Amir Asif, "Continuous and Discrete Time Signals and Systems", Cambridge International Student Edition, Cambridge University Press, 2007.
2. John G.Proakis and Dimitris G.Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications", PHI, 3rd Edition. 2000.
3. B. Venkataramani, M. Bhaskar, "Digital Signal Processors, Architecture, Programming and Applications", Tata McGraw Hill, New Delhi, 2003. (Unit V)
4. Johny R.Johnson, "Introduction to Digital Signal Processing", PHI, 2009.
5. Won Y. Yang et. Al., "Signals and Systems with MATLAB", Springer International Edition, 2009
6. Steven W. Smith, "The Scientists and Engineer's Guide to Digital Signal Processing", California Technical Publishing, 1997.
7. James H. McClellan, Ronald W. Schafer, Mark A. Yoder, "Signal Processing First", 2nd Edition.

U14ITP501 OPERATING SYSTEMS LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1: Demonstrate basic Linux commands

CO2: Develop shell scripts.

CO3: Analyze CPU Scheduling algorithms

CO4: Implement memory management techniques.

CO5: Implement disk scheduling techniques

Pre-requisite:

1. U14ITP301 – Data Structures and Algorithms Lab

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M											
CO3	M	M								W	W	M
CO4	M	W										M
CO5	M	W										

Course Assessment methods:

Direct	Indirect
1.Mid Model Test 2. End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

1. Study of UNIX commands.
2. To write simple shell programs.
3. Simulation of the following CPU scheduling algorithms
   a) FCFS b) Non-Preemptive SJF c) Round Robin
4. Simulation of Bankers algorithm for deadlock avoidance.
5. Simulation of First fit, Best fit and Worst fit memory allocation methods.
6. Simulation of paging technique.
7. Simulation of First in First out and Least Recently Used page replacement algorithms.
8. Simulation of indexed file allocation strategy.
9. Simulation of disk scheduling algorithms
   a) FCFS b) SSTF

Experiments beyond the syllabus should be conducted

Total Hours:30

U14ITP502 SOFTWARE ENGINEERING LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1: Design a Software requirement specification for the application
CO2: Identify classes, methods, data flow (designing) for the application
CO3: Develop the code and test cases for the specific problem
CO4: Develop an automated system for the applications

Pre-requisite:

1. U14ITP402 – Data Base Management Systems Lab

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
CO2	M	M										
CO3	M	W										
CO4	S	S									W	W

Course Assessment methods:

Direct	Indirect
1. Mid Model Test 2. End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

SOFTWARE PROJECT DEVELOPMENT:

Develop a software development project using Rational Suite CASE Tool. The problem selected should consist of at least 10 Use cases.

1. Problem Analysis and Project Planning

Thorough study of the problem – Identification of project scope, objectives and preparation of S.R.S. (in IEEE format)

2. Software Requirement Analysis

Describe the individual phases / modules of the project, identify deliverables. Prepare test plan and test cases.

3. Modelling

Use relevant work products like data dictionary, use case diagram, sequence diagram, activity diagram, class diagram etc

4. Coding (using appropriate language)

5. Software Testing

Perform verification & validation at each stage and generate appropriate reports.

SUGGESTED LIST OF SAMPLE PROJECTS:

Develop the following using Software Engineering Methodology:

1. College Information System
2. Super Market Automation System
3. Restaurant Automation System
4. Judiciary Information System
5. Student Academic Record Management System
6. Medicine Shop Automation
7. Automobile Parts Shop Automation
8. Quiz System
9. ATM Systems
10. Development of Computer Games
11. Railway Ticket Reservation System
12. Payroll Processing System
13. Inventory System
14. Library Management System
15. Book Shop Automation System

Experiments beyond the syllabus should be conducted

Total Hours:30

U14ITP503 JAVA PROGRAMMING LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1: Develop programs using the fundamental concepts in Java

CO2: Develop GUI applications to handle events and to store the data in the database

CO3: Test and debug Java programs for errors and exceptions

Pre-requisite:

1. U14ITP303-Object Oriented Programming Laboratory

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S			S							M
CO2	M	W			M							M
CO3	M	M			M							M

Course Assessment methods:

Direct	Indirect
1.Mid End Semester Exam 2.End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

1. Simple Programs in Java using classes and methods
2. Program for Method Overloading and Method Overriding
   a) Use the concept of Packages and Interfaces
3. Program for User Defined Exception Handling
4. Program using inbuilt methods of String class.
5. Thread Creation
   a) Using Thread Class and Runnable Interface
   b) Inter Thread Communication
6. Program using Input and Output streams
7. Programs using JDBC for developing real time applications(2 experiments)
8. Event handling in Swing (2 experiments)
9. Usage of different components and Layouts in Swing

Experiments beyond the syllabus should be conducted

Total Hours:30

SEMESTER VI

U14ITT601 WEB TECHNOLOGY

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Design and develop web pages using HTML, DHTML and Cascading Style Sheets

CO2: Interpret the role of XML and AJAX in web applications

CO3: Compare and contrast server side technologies like JSP & Servlets

CO4: Apply the knowledge of EJB and Web Services to write multi-tier application in Java

CO5: Infer the knowledge of MVC architecture supported by different frameworks

Pre-requisite:

1. U14ITT503-Java Programming

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S								M		
CO2	M				M							
CO3	M	M										
CO4	M				M							
CO5	M	M										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4.Seminar	1. Course Exit Survey

CLIENT SIDE PROGRAMMING 9 Hours

Style Sheets: HTML-CSS - Introduction to Cascading Style Sheets – Types- Core Syntax – Positioning-Text Effects-Filters -Animation

Client-Side Programming: Introduction to JavaScript – Functions – Objects – Arrays – Built - in Objects - DOM –Event Handling

XML AND AJAX 9 Hours

XML: Documents and Vocabularies - Versions and Declaration –Namespaces- -DOM based XML processing. –XSLT-Evolution of AJAX-AJAX Framework-Web applications with AJAX-AJAX with databases.

SERVER SIDE TECHNOLOGIES 9Hours

Servlet: CGI Vs Servlet-Lifecycle of Servlet-Types of Servlet-Handling HTTP request and response-Status Codes-Cookies-Session Tracking

Java Server Pages: Anatomy of JSP-Scripting Elements-Implicit JSP Objects-JSP with JDBC

EJB AND WEB SERVICES 9 Hours

JavaBeans-Advantages -Enterprise Java Beans: Architecture-Session Beans: Types-Entity Beans-Types-Application development using Session Beans

Web Services in Java: Basics-SOAP-REST-JSON-Publishing and Consuming SOAP and REST based of Web Services

APPLICATION DEVELOPMENT ENVIRONMENT 9 Hours

Overview of MVC architecture-Java Server Faces Technology: Features-Components-Tags-Struts: Working Principle of struts-Building Model Components-View Components-Controller Components-Web applications with Struts

Hibernate Framework: Architecture- Working with Persistent Objects-Developing Simple applications

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Deitel & Deitel , et.al "Internet & World Wide Web - How To Program", Pearson Education, Fifth Edition, 2011.
2. Robert W. Sebesta,"Programming the World Wide Web", Eighth edition,, Pearson pulications,2015
3. Marty Hall and Larry Brown " Core Servlets and Java Server Pages , Volume1",Prentice Hall Education,Second Edition,2003
4. Uttam K Roy,"Web Technologies" Oxford University, 2011.
5. www.w3schools.com
6. http://www.javatpoint.com/struts-2-tutorial

U14ITT602 DATA WAREHOUSING AND DATA MINING

L	T	P	C
3	0	2	4

Course Outcomes :

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

CO1: Identify the characteristics of data warehousing.

CO2: Identify the association rules for mining applications.

CO3: Design appropriate classification/clustering techniques for data mining problems

CO4: Select appropriate tools for various data mining applications.

Pre-requisite :

1. U14ITT402-Database Management System

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	W										
CO2	M	M										
CO3	S	S								M		S
CO4	M	M			S							

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar 5.Project	1. Course Exit Survey

DATA WAREHOUSING 9 Hours

Data warehouse and OLAP technology – Types of Database – Multidimensional data model – Data warehouse architecture – Data cleaning.

DATA MINING PRIMITIVES AND CONCEPT DESCRIPTION 9 Hours

Data mining primitives – Data mining query language - concept description – Data generalization and characterization – Analytical characterization – Mining Descriptive statistical measures in large databases.

CLASSIFICATION AND PREDICTION 9 Hours

Introduction – Decision Tree Induction – Bayesian Classification – Back propagation – Lazy Learners – Other classification methods – Prediction – Evaluating the accuracy

CLUSTERING AND ASSOCIATION 9 Hours

Similarity and Distance Measures – Hierarchical Algorithms – Partition Algorithms – Outlier Analysis – Mining Frequent Patterns, Associations, and Correlations

ADVANCED TOPICS 9 Hours

Web Mining – Web Content Mining – Structure and Usage Mining – Spatial Mining – Time Series and Sequence Mining – Graph Mining

List of Experiments 15 Hours

1. Exercise on Data warehouse design for an enterprise
2. Exercise on Classification algorithms
3. Exercise on Clustering algorithms
4. Exercise on Discovering Association Rules
5. Exercises on Data mining tools

Theory: 45 Hrs Practical: 15 Hrs Total Hours:60

REFERENCES

1. J. Han, M Kamber, "Data Mining: Concepts and Techniques", Third edition, Elsevier, New Delhi, 2011
2. Dunham M, "Data Mining: Introductory and Advanced Topics", Prentice Hall, New Delhi, 2002.
3. Trevor Hastie, Robert Tibshirani, Jerome Friedma, "The Elements of Statistical Learning: Data Mining, Inference and Prediction", Prentice Hall, New Delhi, 2002.
4. Hand.D, Mannila H, Smyth.P, "Principles of Data Mining", MIT press, USA,2001.

U14ITT603 CRYPTOGRAPHY AND NETWORK SECURITY

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Explain security attacks and issues in computer systems and networks.

CO2: Explain the mathematics behind Cryptography

CO3: Explain the purpose and working of various algorithms related to cryptography, authentication, network security and system security algorithms.

CO4: Identify the appropriate security mechanism for different computing environment and information systems.

CO5: Apply appropriate security methods to solve real life applications.

Pre-requisite :

1. U14ITT504 - Computer Networks

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											W
CO2	M											W
CO3	M											W
CO4	M				S							W
CO5	S				S	S		M				M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment/Case studies 4. Seminar	1. Course Exit Survey

INTRODUCTION **10 Hours**

OSI Security Architecture - Classical Encryption Techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation – Evaluation Criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality.

PUBLIC KEY CRYPTOGRAPHY **9 Hours**

Introduction to Number Theory -Key Management - Diffie-Hellman Key Exchange – Elliptic Curve Architecture and Cryptography - Confidentiality using Symmetric Encryption – Public Key Cryptography and RSA.

AUTHENTICATION AND HASH FUNCTION **9 Hours**

Authentication Requirements – Authentication Functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – Secure Hash Algorithm – HMAC Digital Signatures – Authentication Protocols – Digital Signature Standard.

NETWORK SECURITY **9 Hours**

Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

SYSTEM LEVEL SECURITY **8 Hours**

Intrusion Detection — Firewall Design Principles – Trusted Systems. Case study: Biometric authentication and Ethical Hacking

Theory: 45 Hrs **Total Hours : 45**

REFERENCES

1.William Stallings, "Cryptography and Network Security – Principles and Practices", Fifth edition, Prentice Hall of India, 2010.

2. Atul Kahate, "Cryptography and Network Security", 2nd Edition, Tata McGraw Hill, 2008

3. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.

4.Charles B. Pfleeger and Shari Lawrence Pfleeger, "Security in Computing", Third edition, Pearson Education, 2003.

U14ITT604 PRINCIPLES OF COMPILER DESIGN

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Describe the various phases of a compiler

CO2: Construct DFA from a given regular expression

CO3: Examine Top-down and Bottom-up parsing Techniques

CO4: Write intermediate code

CO5: Identify various types of optimizations on intermediate code and generate assembly code

Pre-requisite:

1. U14MAT308 – Discrete Mathematics

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	W										
CO2	M	M										
CO3	M	M										W
CO4	M	M										
CO5	M	M										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment	1. Course Exit Survey

INTRODUCTION AND LEXICAL ANALYSIS **9 +3Hours**

Language Processors – The Structure of Compiler – Applications of Compiler Technology – Programming Language Basics. Lexical Analysis – The Role of the Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – The Lexical-Analyzer Generator - LEX– Finite Automata – From Regular Expression to Automata – Design of a Lexical-Analyzer Generator – Optimization of DFA-Based Pattern Matchers.

SYNTAX ANALYSIS **9+5 Hours**

Introduction – Context-Free Grammars – Writing a Grammar – Top-Down Parsing – Recursive-Descent Parsing and Predictive Parsers - Bottom-up Parsing – Shift-Reduce Parsing and Operator Precedence Parsing - Introduction to LR Parsing: Simple LR – More Powerful LR Parsers – Canonical LR and LALR Parsers.

INTERMEDIATE CODE GENERATION **9+3 Hours**

Variants of Syntax Trees – Three-Address Code – Types and Declarations – Translation of Expressions – Type Checking – Control Flow – Back patching – Switch-Statements – Intermediate Code for Procedures.

CODE GENERATION **9+2 Hours**

Issues in the Design of a Code Generator – The Target Language – Addresses in the Target Code – Basic Blocks and Flow Graphs – Optimization of Basic Blocks – A Simple Code Generator – Peephole Optimization.

CODE OPTIMIZATION AND RUN-TIME ENVIRONMENT **9+2 Hours**

The Principal Sources of Optimization – Introduction of Data-Flow Analysis – Loops in Flow Graphs Run-Time Environments – Storage Organization – Stack Allocation of Space – Heap Management.

Theory:45 Hrs Tutorial: 15 Hrs **Total Hours:60**

REFERENCES

1. Alfred V. Aho et al “Compilers Principles, Techniques and Tools”, Second edition , Pearson Education,2007.
2. Allen I. Holub, “Compiler Design in C”, Prentice Hall of India, 2003.
3. Fischer C.N. and LeBlanc R.J. “Crafting a Compiler with C”, Benjamin Cummings, 2003.
4. Bennet J.P. “Introduction to Compiler Techniques”, Second edition, Tata McGraw-Hill, 2003.
5. HenkAlblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, PHI, 2001.
6. Kenneth C. Louden, “Compiler Construction: Principles and Practice”, Thompson Learning, 2003.

U14ITP601 WEB TECHNOLOGY LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1: Demonstrate the creation of interactive web pages

CO2: Develop distributed Java applications and XML documents based on AJAX

CO3: Compare the various types of web services and frameworks

Pre-requisite:

1. U14ITT503-Java Programming

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S			S							M
CO2	M	W			M							M
CO3	M	M			M							M

Course Assessment methods:

Direct	Indirect
1.Mid End Semester Exam 2.End Semester Exam 3. Projects	1. Course Exit Survey

LIST OF EXPERIMENTS

1. Create a web page using web development tool using HTML 5
2. Client Side Scripts for Validating Web Form Controls using JavaScript and Animation using Java Script
3. Program using XML Schema
4. Program using XSLT/XSL
5. Web Application development using AJAX
6. Web Application development using JSP with JDBC
7. Session Tracking and cookies management using Servlet
8. Application Development using Session Beans
9. Creation of SOAP based Web Services & Restful based Web Services and consume it an application
10. Study of Struts and Hibernate Frameworks
11. Creation of web enabled applications using Struts Framework and Hibernate framework

Experiments beyond the syllabus should be conducted

Total Hours:30

U14ITP602 COMPUTER NETWORKS LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1: Develop knowledge to implement client server applications

CO2: Develop skills in Unix socket programming.

CO3: Develop skills to use simulation tools.

CO4: Analyze the performance of network protocols

CO5: Analyze the network traffic.

Pre-requisite :

1. U14ITT504-Computer Networks

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S									M
CO2			M									S
CO3					M							M
CO4				S								M
CO5		S										M

Course Assessment methods:

Direct	Indirect
1.Mid Model Tests 2. End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

1. Develop client server based TCP applications using UNIX socket programming functions.
2. Develop client server based UDP applications using UNIX socket programming functions.
3. Implementation of HTTP\DNS\ARP\RARP protocols.
4. Implementation of sliding window and CRC protocols.
5. Implementation of Distance Vector and Link state routing protocols.
6. Study of network simulation tools such as NS2 \ QUALNET.
7. Performance analysis of TCP\UDP protocol using simulation tool
8. Performance analysis of routing protocols using simulation tool.
9. Demonstrate the working of network tools such as Ping, TCPDump, Traceroute, Netstat, IPconfig.
10. Analyze the network traffic using Wireshark tool.

Experiments beyond the syllabus should be conducted

Total Hours:30

U14ITP603 MOBILE APPLICATIONS PROGRAMMING LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1: Understand and apply the key technological principles and methods for delivering and maintaining mobile applications.

CO2: Develop and apply current standard-compliant scripting/programming techniques for the successful deployment of mobile applications targeting a variety of platforms.

CO3: Interpret a scenario, plan, design and develop a prototype hybrid and native mobile application.

CO4: Investigate the leading edge developments in mobile application development and use these to inform the design process.

CO5: Develop apps for Android Devices.

Pre-requisite :

1. U14ITT503-Java Programming

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	M				S		S			M
CO2	M	M				M						
CO3	M	M	M									
CO4	M						M		M			
CO5	S						M		S	M		

Course Assessment methods:

Direct	Indirect
1.Mid Model Tests 2. End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

1. Developing Simple Applications for Android
2. Creating Applications with Multiple Activities and a Simple Menu using ListView
3. Creating Activities For Menu Items and Parsing XML Files
4. Writing Multi-Threaded Applications

5. Using Web View and Using the Network
6. Using Audio Functions in Android
7. Graphics Support in Android
8. Preferences and Content Providers
9. Location Services and Google Maps in Android
10. Developing mobile applications using Sensors

Experiments beyond the syllabus should be conducted

Total Hours:30

SEMESTER VII

U14ITT701 MOBILE AND PERVASIVE COMPUTING

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Explain the concepts and features of mobile computing and transmission technologies.

CO2: Describe the architecture and working of wireless communication networks and protocols.

CO3: To explore the characteristics of different types of Wireless LAN networks.

CO4: Explain the working of wireless routing protocols.

CO5: Outline the characteristics of pervasive computing applications.

Pre-requisite :

1. U14ITT504 - Computer Networks.

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2	M		M		M							
CO3	M	M					M		M			
CO4	M											
CO5	M											

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

WIRELESS COMMUNICATION

9+3 Hours

Cellular systems- Frequency Management and Channel Assignment- Types of Handoff and their Characteristics -Dropped Call Rates & their Evaluation - MAC - SDMA - FDMA - TDMA - CDMA - Cellular Wireless Networks.

MOBILE COMMUNICATION SYSTEMS 10+3 Hours

GSM – Architecture -Location Tracking and Call Setup - Mobility Management- Handover-Security-GSM SMS –International roaming for GSM- call recording functions-subscriber and service data management –Mobile Number portability -VoIP service for Mobile Networks –GPRS –Architecture-GPRS procedures-attach and detach procedures-PDP context procedure-combined RA/LA update procedures-Billing.

WIRELESS NETWORKS 9+3 Hours

Wireless LAN – IEEE 802.11 Standards – Architecture – Services – Mobile Ad hoc Networks- WiFi and WiMAX - Wireless Local Loop.

MOBILE NETWORK AND TRANSPORT LAYERS 9+3 Hours

Mobile IP – Dynamic Host Configuration Protocol-Mobile Ad Hoc Routing Protocols– Multicast routing-TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing-Selective Retransmission – Transaction Oriented TCP- TCP over 2.5 / 3G wireless Networks.

PERVASIVE COMPUTING 8+3 Hours

Pervasive Computing- Principles, Characteristics- Interaction Transparency, Context aware, Automated Experience Capture. Architecture for Pervasive Computing- Pervasive devices- Embedded controls- Smart Sensors and Actuators -Context Communication and Access Services.

Theory: 45 Hrs Tutorial:15 Hrs Total Hours:60

REFERENCES

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2009.
3. KavehPahlavan, PrasanthKrishnamoorthy, “Principles of Wireless Networks”, First Edition, Pearson Education, 2003.
4. Andreas F. Molisch, “Wireless Communications”, 2nd Edition, Wiley 2010.
5. Seng Loke, Context-Aware Computing Pervasive Systems, Auerbach Pub., New York,2007.
6. Uwe Hansmannetl , Pervasive Computing, Springer, New York,2001.

U14GST003 PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Understand the concepts of management, administration and the evolution of management thoughts.

CO2: Understand and apply the planning concepts.

CO3: Analyze the different organizational structures and understand the staffing process.

CO4: Analyze the various motivational and leadership theories and understand the communication and controlling processes.

CO5: Understand the various international approaches to management

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							M		S		S	W
CO2								M	S	M		M
CO3							M	M	M			W
CO4									M	M	M	M
CO5									S			M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. Assignments 3. End Semester Exam	Course End Survey

MANAGEMENT CONTEXT **9 Hours**

Management – Definition – Importance – Functions – Skills required for managers - Roles and functions of managers – Science and Art of Management –Management and Administration. Evolution of Classical, Behavioral and Contemporary management thoughts.

PLANNING **9 Hours**

Nature & Purpose – Steps involved in Planning – Forms of Planning – Types of plans – Plans at Individual, Department and Organization level - Managing by Objectives. Forecasting – Purpose – Steps and techniques. Decision-making – Steps in decision making.

ORGANISING

9 Hours

Nature and Purpose of Organizing - Types of Business Organization - Formal and informal organization – Organization Chart – Structure and Process – Strategies of Departmentation– Line and Staff authority – Benefits and Limitations. Centralization Vs De-Centralization and Delegation of Authority. Staffing – Manpower Planning – Recruitment – Selection – Placement – Induction.

DIRECTING & CONTROLLING

9 Hours

Nature & Purpose – Manager Vs. Leader - Motivation - Theories and Techniques of Motivation. Leadership – Styles and theories of Leadership.
Communication – Process – Types – Barriers – Improving effectiveness in Communication.
Controlling – Nature – Significance – Tools and Techniques.

CONTEMPORARY ISSUES IN MANAGEMENT

9 Hours

Corporate Governance Social responsibilities – Ethics in business – Recent issues.
American approach to Management, Japanese approach to Management, Chinese approach to Management and Indian approach to Management.

Theory: 45 Hrs **Total Hours: 45**

REFERENCES

1. Tripathy PC And Reddy PN, "Principles of Management", Tata McGraw-Hill, 4th Edition, 2008.
2. Dinkar Pagare, "Principles of Management", Sultan Chand & Sons, 2000.
3. Kanagasapapathi. P (2008) Indian Models of Economy, Business and Management, Prentice Hall of India, New Delhi, ISBN: 978-81-203-3423-6.
4. G.K.Vijayaraghavan and M.Sivakumar, "Principles of Management", Lakshmi Publications, 5th Edition, 2009.
5. Harold Koontz & Heinz Weihrich, "Essentials of Management – An International perspective", 8th edition. Tata McGraw-Hill, 2009.
6. Charles W.L. Hill and Steven L McShane – Principles of Management, Tata Mc Graw-Hill, 2009.

U14ITT702 CLOUD COMPUTING

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Develop private cloud using tools
CO2: Identify cloud service and its applications
CO3: Illustrate functions of web service with cloud service.
CO4: Apply virtualization concepts for real time problems
CO5: Discuss various security and standard in cloud computing

Pre-requisite :

1. U14ITT504-Computer Networks

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	W			S				S	M		W
CO2	M	W										
CO3	M	W										
CO4	M	W			S				S	M		M
CO5	M											

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

CLOUD INTRODUCTION **9+3 Hours**

Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim

CLOUD SERVICES AND FILE SYSTEM 9+3 Hours

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to Map Reduce, GFS, HDFS, Hadoop Framework.

COLLABORATING WITH CLOUD 9+3 Hours

Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing ,Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis

VIRTUALIZATION FOR CLOUD 9 +3 Hours

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation an and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

SECURITY, STANDARDS, AND APPLICATIONS 9 +3Hours

Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud binary translation.

Theory: 45 Hrs Tutorial: 15 Hrs **Total Hours:60**

REFERENCES

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz “Cloud Computing for Dummies” (Wiley India Edition),2010
2. John Rittinghouse & James Ransome, “Cloud Computing Implementation Management and Strategy”, CRC Press, 2010.
3. Antohy T Velte ,Cloud Computing : “A Practical Approach”, McGraw Hill,2009
4. Michael Miller, Cloud Computing: “Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August 2008.
5. James E Smith, Ravi Nair, “Virtual Machines”, Morgan Kaufmann Publishers, 2006.
6. http://cloud-standards.org/wiki/index.php?title=Main_Page

U14ITP701 WIRELESS NETWORKS LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1. Demonstrate knowledge in use of simulation tool

CO2. Develop skills to install and configure wireless devices

CO3. Evaluate the performance of wireless routing protocols

CO4. Develop mobile application for wireless communication

CO5. Examine the effect of MAC layer characteristics of a wireless network

Pre-requisite:

1. U14ITP602-Computer Networks Laboratory

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					S							M
CO2	S											M
CO3		M										S
CO4		S										M
CO5		M										S

Course Assessment methods:

Direct	Indirect
1.Mid Model Exam 2. End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

1. Demonstrate installation of a WLAN adapter card in a desktop and laptop.
2. Demonstrate configuration of a wireless access point.
3. Develop a mobile application that turns on Bluetooth and communicate with another phone and transfer a picture file from one phone to other.
4. Develop a mobile application to enable a continuous chat between the two phones.
5. Analyze the behavior of wireless network in infrastructure and ad hoc mode.
6. Evaluate the performance of unicast routing protocol in ad hoc networks.

7. Evaluate the performance of multicast routing protocols in ad hoc networks.
8. Evaluate the performance of broadcasting in ad hoc networks.
9. Evaluate the performance of various queuing disciplines in ad hoc networks.
10. Examine the effect of physical and MAC layer characteristics of wireless links using signal strength, data rate, retransmission and delay measurement.

Experiments beyond the syllabus should be conducted

Total Hours:30

U14ITP702 CLOUD COMPUTING LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes :

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

CO1: Analyze various cloud simulator

CO2: Apply resource allocation, scheduling algorithms.

CO3: Implement Energy-conscious model.

CO4: Create virtual machines from available physical resources.

CO5: Setup a private cloud.

Pre-requisite: Nil

CO/PO Mapping												
COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M		S	S							
CO2	M	M							S			
CO3	W											
CO4				S	S				S			
CO5				S	S				S			

Course Assessment methods:

Direct	Indirect
1.Mid Model Exam 2. End Semester Exam	1. Course Exit Survey

LIST OF EXPERIMENTS

1. Setup a Private Cloud Using Open Stack or Eucalyptus. Develop simple applications and make it available to the intended user.
2. Compare at least two parallel computing algorithm and calculate its cost
3. Develop Market oriented cloud computing model using Aneka toolkit
4. Prove that bio-inspired model is suitable for cloud computing
5. Compare energy conscious algorithm using green cloud simulator
6. Develop Economic based scheduling algorithm for cloud computing
7. Create algorithm using different Queuing model for cloud computing
8. Study and compare various simulators in cloud computing.

Experiments beyond the syllabus should be conducted

Total Hours:30

ELECTIVES FOR SIXTH SEMESTER

U14ECT614 PRINCIPLES OF COMMUNICATION

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Understand the fundamental concepts of communication systems

CO2: Distinguish the different modulation schemes with their transmitter and receiver parameters.

CO3: Identify and classify the different analog and digital modulation schemes.

CO4: Classify standard base band data transmission techniques.

CO5: Paraphrase the spread spectrum techniques and multiple access techniques

Pre-requisite: Nil

CO/PO Mapping												
COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2	M	W										
CO3	M	W	W									
CO4	M											
CO5	M	W										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

AMPLITUDE MODULATION: TRANSMISSION AND RECEPTION 9+3 Hours

Principles of amplitude modulation - AM envelope, Frequency spectrum and bandwidth, Modulation index and percent modulation, AM power distribution, AM modulator circuits - Low level AM modulator, Medium power AM modulator, AM demodulator, Receiver parameters. AM reception: AM receivers - TRF, Super heterodyne receivers.

ANGLE MODULATION: TRANSMISSION AND RECEPTION 9+3 Hours

Angle Modulation - FM and PM, Mathematical representation, waveform, Bandwidth, FM modulators and Demodulators, Direct and Indirect FM transmitters, Frequency Vs. Phase Modulation.

DIGITAL MODULATION TECHNIQUES **9+3 Hours**

Introduction, Binary PSK, DPSK, QPSK, QASK, Binary FSK, MSK, Performance comparison of various systems of Digital Modulation.

BASEBAND DATA TRANSMISSION **9+3 Hours**

Sampling theorem, Reconstruction of message from its samples, PCM DPCM, DM, ADM, ISI, Nyquist Criterion for distortion less baseband binary transmission

SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES **9+3 Hours**

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, Processing gain, Probability of error, FH spread spectrum, multiple access techniques.

Theory: 45 Hrs Tutorial: 15 Hrs **Total Hours:60**

REFERENCES

1. Wayne Tomasi, "Electronic Communication Systems: Fundamentals Through Advanced" Pearson Education, 2001.
2. Simon Haykin, "Digital Communications", John Wiley & Sons, 2003.
3. Simon Haykin, "Communication Systems", John Wiley & Sons, 4th edn.,2001.
4. Taub & Schilling, "Principles of Communication Systems", TMH, 2nd edn., 2003.
5. Martin S.Roden, "Analog and Digital Communication System", PHI, 3rd edn. 2002.
6. Blake, "Electronic Communication Systems", Thomson Delman, 2nd edn., 2002

U14ITTE11 THEORY OF COMPUTATION

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Explain automata theory as the basis of all computer science languages design

CO2: Identify different types of grammars

CO3: Build grammars for a given language and vice versa.

CO4: Develop Finite Automata; Push down Automata and Turing machines

CO5: Classify decidable and undecidable problems, solvable and unsolvable problems

Pre-requisite :

1. U14MAT101-Engineering Mathematics-I
2. U14ITT301-Data Structures and Algorithms

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M	W										
CO3	M	W										
CO4	M	W										
CO5	M	W										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

AUTOMATA **8+3 Hours**

Basic Machines Finite Automata (FA) - Deterministic Finite Automata (DFA) - Non-deterministic Finite Automata (NFA) - Finite Automata with Epsilon transitions.

REGULAR EXPRESSIONS AND LANGUAGES **9+3 Hours**

Finite State Automata and Regular Expressions – Converting regular expression to Finite Automata – Subset construction – Epsilon Closure – NFA to DFA - Applications of finite automata - Proving languages not to be regular -Equivalence and minimization of Automata - Decision algorithms.

CONTEXT-FREE GRAMMAR AND LANGUAGES **10+3Hours**

Context-Free Grammar (CFG) - Parse Trees - Ambiguity in grammars and languages - Definition of the Pushdown automata - Languages of a Pushdown Automata - Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata. Properties of context free languages - Normal forms for CFG – Chomsky Normal Form(CNF) – Greibach Normal Form(GNF)- Pumping Lemma for CFL - Closure Properties of CFL

TURING MACHINES **9+3 Hours**

Definitions of Turing machines – Models – Computable languages and functions –Techniques for Turing machine construction – Multi head and Multi tape Turing Machines - The Halting problem – Partial Solvability – Problems about Turing machine- Chomsky hierarchy of languages.

UNSOLVABLE PROBLEMS AND COMPUTABLE FUNCTIONS **9+3 Hours**

Unsolvable Problems and Computable Functions – Primitive recursive functions – Recursive and recursively enumerable languages – Universal Turing machine

Measuring And Classifying Complexity: Tractable and Intractable problems- Tractable and possibly intractable problems- P and NP completeness - Polynomial time reductions

Theory: 45 Hrs Tutorial: 15 Hrs **Total Hours:60**

REFERENCES

1. John C.Martin, “Introduction to Languages and the Theory of Computation”, Third Edition, Tata McGraw Hill, 2003.
2. J.E.Hopcroft, R.Motwani and J.D Ullman, “Introduction to Automata Theory, Languages and Computations”, Second Edition, Pearson Education, 2003.
3. H.R.Lewis and C.H.Papadimitriou, “Elements of The theory of Computation”, Second Edition, Pearson Education/PHI, 2003
4. Micheal Sipser, “Introduction of the Theory and Computation”, Thomson Brokecole, 1997.
5. Kavi Mahesh, “Theory of Computation, A Problem-solving Approach” Wiley India Pvt, Ltd, 2012.

U14ITTE12 C# AND .NET PROGRAMMING

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Compare and contrast the features of C# over Java and vice versa.
CO2: Explain how C# provides support for OOPS concepts and event handling.
CO3: Develop the web based applications using ADO.NET in C#
CO4: Apply XML in the .NET environment to create Web Service-based applications
CO5: Summarize the basics of Asynchronous programming

Pre-requisite :

1. U14ITT303- Object Oriented Programming with C++
2. U14ITT503-Java Programming

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
CO2	M	W										
CO3	M	M			M							
CO4	M	M			M							
CO5	M	W										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar 5. Mini project	1. Course Exit Survey

C# LANGUAGE BASICS 9 +3Hours

.NET architecture:CLR-Intermediate Language-Assemblies-Framework Classes-Namespaces-C# basics-Objects and Types-Inheritance-Arrays and tuples

C# ADVANCED FEATURES **9+3 Hours**

Delegates and Events-Strings-Regular Expressions- Asynchronous programming**:** Patterns-Foundation-Error Handling-Cancellation

9 +3Hours

ASP .NET & ADO .NET

Core ASP.NET- web forms-Web Controls-State Management Techniques- ADO.NET: Database Connections-Commands-Data Reader class-Managing data and relationships-Populating a dataset

WEB SERVICES & MVC PROGRAMMING **9+3 Hours**

Introduction to Web Services: XML,SOAP,UDDI-Creating ,publishing and consuming simple web services-ASP.NET MVC: MVC Programming model- Advantages of an MVC-Based Web Application-Razor Basics-

9+3 hours

PARALLEL PROGRAMMING

Parallel class-Threads and Synchronization -Memory Management and pointers-Reflection—Assemblies

Theory: 45 Hrs Tutorial: 15 Hrs **Total Hours:60**

REFERENCES

1. Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner, "Professional C# 2012 and .NET 4.5",Wiley Publications,2012
2. Ian Griffiths, "Programming C# 5.0", Oreilly publications,First edition,2012
3. Andrew Troelsen, "Pro C# 5.0 and the .NET 4.5 Framework,"Apress,Sixth edition,2012
4. Karli Watson, Jacob Vibe Hammer..et .al, "Beginning Visual C# 2012 Programming", Wiley Publications,2012
5. http://www.microsoftvirtualacademy.com/training-courses/introduction-to-asp-net-mvc
6. http://www.c-sharpcorner.com/UploadFile/1d42da/web-service-basics

U14 MAT601 NUMERICAL METHODS

L	T	P	C
3	0	2	4

Course Outcomes :

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

CO1: Solve a set of algebraic equations representing steady state models formed in engineering problems

CO2: Fit smooth curves for the discrete data connected to each other or to use interpolation methods over these data tables

CO3: Find the trend information from discrete data set through numerical differentiation and summary information through numerical integration

CO4: Predict the system dynamic behaviour through solution of ODEs modeling the system

CO5: Solve PDE models representing spatial and temporal variations in physical systems through numerical methods.

CO6: Have the necessary proficiency of using MATLAB for obtaining the above solutions..

Pre-requisite :

1. Linear, non-linear, transcendal equations, Differential equations and Partial differential equations.

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S									
CO2	M		M									
CO3	S	M		M								
CO4	S	S	M		S							
CO5				M	S							
CO6	M	M	M	M	M							

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Matlab exercise

INTRODUCTION **3 Hours**

Simple mathematical modeling and engineering problem solving – Algorithm Design – Flow charting and pseudocode - Accuracy and precision – round off errors.

NUMERICAL SOLUTION OF ALGEBRAIC EQUATIONS **7+3 Hours**

Solution of nonlinear equations: False position method – Fixed point iteration – Newton Raphson method for a single equation and a set of non- linear equations

Solution of linear system of equations by Gaussian elimination method - Gauss Jordan method - Gauss Seidel method.

CURVE FITTING AND INTERPOLATION **7+3 Hours**

Curve fitting – Method of least squares – Regression – Interpolation: Newton's forward and backward difference formulae – Divided differences – Newton's divided difference formula - Lagrange's interpolation – Inverse interpolation.

NUMERICAL DIFFERENTIATION AND INTEGRATION **7 +3Hours**

Numerical differentiation by using Newton's forward, backward and divided differences – Numerical integration by Trapezoidal and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – Numerical double integration.

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS **10+3 Hours**

Initial value problems -- Single step methods: Taylor's series method – Truncation error – Euler and Improved Euler methods – Fourth order Runge - Kutta method – Multistep method: Milne's predictor -- corrector method.

NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS (PDEs) **11+3 Hours**

PDEs and Engineering Practice – Laplace Equation derivation for steady heat conduction – Numerical solution of the above problem by finite difference schemes – Parabolic Equations from Fourier`s Law of Transient Heat Conduction and their solution through implicit schemes – Method of Lines – Wave propagation through hyperbolic equations and solution by explicit method.

Theory: 45 Hrs Practical: 15 Hrs **Total Hours:60**

REFERENCES

1. Steven C.Chapra and Raymond P. Canale, " Numerical Methods for Engineers with Programming and Software Applications", SixthEdition, WCB/McGraw-Hill, 1998.
2. John H. Mathews and Kurtis D. Fink, "Numerical Methods using Matlab", Fourth Edition, Prentice Hall of India, 2004.
3. Gerald C. F. and Wheatley P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2002.
4. Sastry S.S, "Introductory Methods of Numerical Analysis", Third Edition, Prentice – Hall of India Pvt Ltd, New Delhi, 2003.
5. Kandasamy P., Thilagavathy K. and Gunavathy K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2007

U14ITTE13 EMBEDDED SYSTEMS

L	T	P	C
3	0	2	4

Course Outcomes :

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

CO1: Explain the characteristics and components of embedded systems, their design tools and applications

CO2: Apply the fundamentals of digital system design and programming skills to develop Microcontroller based embedded applications.

CO3: Understand the various communication standards that can serve an embedded systems application

CO4: Explain the concepts of RTOS and compare it with other OS.

CO5: Apply the hardware and software co-design concepts for designing embedded system.

Pre-requisite :

1. U14ITT302- Digital Systems and Design
2. U14ITT401-Microprocessors and Microcontroller

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
CO2	S				M							M
CO3	S							M				M
CO4	S											
CO5	S		M									

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INTRODUCTION OF EMBEDDED SYSTEM DESIGN 9+6 Hours

Introduction to Embedded Systems – categories, specialties and recent trends – Selection of Embedded Processors, Microprocessors, Microcontrollers, DSP and ASICs, Comparative Assessment of Embedded processors. Embedded devices: Memory Devices, ROM and RAM Family, Interfacing Memory, I/O devices.

AN 8 BIT EMBEDDED PLATFORM **9+6 Hours**

PIC Microcontroller - Architecture of PIC Mid range series 16F – PIC16F877A – Memory organization – Special Function Registers(SFR) and General Purpose Registers(GPR) – Instruction set – FSR - Addressing modes – EEPROM – System peripherals - WDT

EMBEDDED SYSTEM SOFTWARE **9+6 Hours**

Real-Time Operating Systems **(RTOS):** Introduction, Real Time Issues – Modeling Timing Constraints – Scheduling - Memory Management, I/O Management and Device Drivers. Introduction to software design -Software Development life cycle, Software modeling. Tools for design, development and testing of embedded software.

EMBEDDED I/O AND COMMUNICATION **9+6 Hours**

User peripherals - Input-Output Ports and Interfacing, Simple I/O Programming, Interrupts and their Servicing, Timing Devices and Interfacing, Analog I/O Techniques - Embedded Communication - Parallel Bus Standards, Serial Bus Standards, Networking Standards, Wireless Standards.

DESIGN AND APPLICATIONS **9+6 Hours**

Field Programmable Devices and Applications, Introduction to Hardware Description Languages, Design of systems using Embedded Processors and Components, Design - Case Studies.

Theory: 45 Hrs Practical: 15 Hrs **Total Hours:60**

REFERENCES

1. Raj Kamal, "Embedded Systems Architecture, Programming and Design", Second edition, Tata McGraw-Hill, 2008.
2. Ajay V Deshmukh, "Microcontroller Theory and Applications", Tata McGraw-Hill, 2007.
3. Prasad K.V.K.K, "Embedded/Real-Time Systems: Concepts, Design and Programming",Dream Tech Press, Reprint, 2009.
4. David E.Simon, "An Embedded Software Primer", Pearson Education, 2003.
5. Daniel W Lewis, "Fundamentals of Embedded Software", Pearson Education Asia, 2001.
6. John B Peatman, "Designing with PIC Microcontroller", Pearson, 1998.

U14CST601 ARTIFICIAL INTELLIGENCE

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Describe the modern view of AI as the study of agents that receive percepts from the environment and perform actions

CO2: Demonstrate awareness of informed search and exploration methods

CO3: Explain about AI techniques for knowledge representation, planning and uncertainty management

CO4: Develop knowledge of decision making and learning methods

CO5: Describe the use of AI to solve English Communication problems

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		S										
CO3	S	M										
CO4		M										
CO5	S	M										

Course Assessment methods:

Direct	Indirect
1.Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INTELLIGENT AGENTS AND SEARCHING METHODS 9 Hours

Definitions of AI - **Intelligent Agents:** Agents and environments - Good behavior – The nature of environments – structure of agents.

Problem solving agents: Formulating problems – searching for solutions – Uninformed search strategies.

Informed search and exploration: Informed search strategies – heuristic functions – local search algorithms.

LOGIC 9 Hours

Logical agents: Knowledge-based agents – The Wumpus world. Logic – Propositional logic: A very simple logic.

First order logic: Representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic.

Inference in First order logic: propositional versus first order logic – unification and lifting – forward chaining – backward chaining – Resolution.

PLANNING AND UNCERTAINTY 9 Hours

Planning: The planning problem- planning with state-space search-partial order planning- graphs – planning with propositional logic.

Uncertainty: Overview of probability concepts, Representing knowledge in an Uncertain Domain, Semantics of Bayesian Networks, Exact Inference in Bayesian Networks.

DECISION MAKING AND LEARNING 9 Hours

Making Simple Decisions: The basis of Utility theory – Utility and multi-attribute utility functions – decision networks – The value of information – Decision theoretic expert systems.

Learning from Observations: Forms of learning - Inductive learning - Learning decision trees. Knowledge in Learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming.

LEARNING AND COMMUNICATION 9 Hours

Statistical Learning Methods: Introduction to neural networks, Perceptrons, Multi-layer feed forward network, Application of ANN.

Reinforcement Learning: Passive reinforcement learning - Active reinforcement learning - Generalization in reinforcement learning.

Communication: Communication as action – Formal grammar for a fragment of English – Syntactic analysis – Augmented grammars – Semantic interpretation – Ambiguity and disambiguation – Discourse understanding – Grammar induction.

Theory: 45 Hrs **Total Hours: 45**

REFERENCES

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, 2nd Edition, Pearson Education / Prentice Hall of India, 2004.
2. Elaine Rich, Kevin Knight , Shivashankar.B.Nair, “Artificial Intelligence”, Tata Mc Graw Hill Publishing Company Limited. Third Edition , 2009
3. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
4. George F. Luger, “Artificial Intelligence-Structures and Strategies For Complex Problem Solving”, Pearson Education / PHI, 2002.

U14ITTE21 SOFTWARE ARCHITECTURE

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Identify the key elements of software architecture

CO2: Explain the architectural styles.

CO3: Explain the various documentation approaches and architectural description languages

CO4: Compare various architecture styles.

Pre-requisite :

1. U14ITT502-Software Engineering

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M	W										
CO3	M							W	W			W
CO4	M	M										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INTRODUCTION 8 Hours

Introduction – software design levels – software engineering discipline – architecture business cycle – architectural patterns – reference models – architectural structures, views

BASICS OF ARCHITECTURAL STYLES 9 Hours

Architectural styles – pipes and filters – object-orientation – invocation – layered systems – repositories – interpreters – process control – heterogeneous architectures – case studies

ARCHITECTURAL STYLES **10 Hours**

Architecture and functionality – architecture qualities – architecture in the lifecycle - Architectural design - Shared information systems – database integration – integration in software development environments – architectural structures for shared information systems

GUIDANCE NA NOTATIONS **9 Hours**

Architectural design guidance – design space – design rules – applying design space – quantified design space – formal models and specification – formalizing architectural style, design space - z – notation

ADVANCED TOPICS **9 Hours**

Linguistic issues – requirements for architectural description languages – first class connectors – adding implicit invocation to traditional programming languages – tools for architectural design – universal connector language - Software architecture. Documentation – reconstruction**.**

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Mary shaw and David Garlan, "Software Architecture – Perspectives on an emerging discipline", Pearson education, 2008.
2. Len Bass, Paul Clements, Rick Kazman, "Software Architecture in Practice", Addison-Wesley, 2003.
3. Christine Hofmeister, Robert Nord, Dilip Soni, "Applied Software Architecture: A Practical Guide for Software Designers", Addison-Wesley, 1999
4. David M. Dikel, David Kane, James R. Wilson, "Software Architecture: Organizational Principles and Patterns", Prentice Hall, 2001
5. Jan Bosch, Morven Gentleman, Christine Hofmeister, Juha Kuusela, "Software Architecture: System Design, Development and Maintenance", Springer, 2002

U14ITTE22 COMPUTER GRAPHICS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Explain graphics primitives and the working of Input/ Output devices

CO2: Apply geometric transformations in objects

CO3: Explain the graphics modeling process

CO4: Build virtual scenes with animation

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	S	M										
CO3	M											
CO4	S	M			M					S		

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Mini Project	1. Course Exit Survey

OVERVIEW OF GRAPHICS SYSTEMS, OUTPUT PRIMITIVES 9 Hours

Video Display devices – Raster Scan Systems –Random Display Systems – Hard Copy Devices. Points and Lines – Line drawing algorithms – Circle generating algorithms – Ellipse generating algorithms.

TWO-DIMENSIONAL GEOMETRIC TRANSFORMATIONS, TWO-DIMENSIONAL VIEWING 9 Hours

Basic Transformations – Matrix Representations – Composite Transformations – Reflection and Shearing Transformations- Affine Transformations. The Viewing pipeline – Viewing Coordinate Reference Frame – Window to View port Coordinate Transformation – Two Dimensional Viewing Functions – Clipping Operations –Point Clipping – Line clipping – Polygon Clipping – Curve Clipping.

THREE-DIMENSIONAL CONCEPTS, THREE-DIMENSIONAL OBJECT REPRESENTATIONS **9 Hours**

Three Dimensional Display Methods –Parallel Projection – Perspective Projection –Depth Cueing – Visible Line and Surface Identification –Surface Rendering – Exploded and Cutaway Views – Three Dimensional and Stereoscopic Views.

Polygon Surfaces – Curved lines and Surfaces – Quadric Surfaces – Blobby Objects – Spline representation – Bezier Curves and Surfaces – Fractal Geometry Methods - Visualization of data sets.

THREE DIMENSIONAL GEOMETRIC AND MODELING TRANSFORMATIONS, THREE DIMENSIONAL VIEWING **9 Hours**

Translation – Rotation –Scaling – Reflection and Shearing Transformations – Composite transformations – Three dimensional Transformation Functions Modeling and Coordinate transformations. Viewing Pipeline – Viewing Coordinates – Projections – View volumes - General Projection transformations –Clipping – Visible Surface Detection - Rendering.

COLOUR MODELS AND COLOUR APPLICATIONS, COMPUTER ANIMATION **9 Hours**

Properties of Light – Standard Primaries and Chromaticity Diagram – Intuitive Colour Concepts – RGB Colour Model – YIQ Colour Model – CMY Colour Model – HSV Colour Model – Conversion between HSV and RGB Models - HLS Colour Model – Colour selection and Applications. Design of Animation Sequences – General Computer Animation Functions – Raster Animations – Computer Animation Languages – Key Frame Systems – Motion Specifications.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Donald Hearn, M. Pauline Baker and Warren Caritthers, “Computer Graphics with OpenGL”, Fourth edition, Prentice Hall, 2010.

2. Peter Shirley, “Fundamentals of Computer Graphics”, Third Edition, A K Peters, 2009.

3. Amarendra N Sinha, Arun D Udai, “Computer Graphics”, Tata McGraw Hill, 2012.

4. Foley, Vandam, Feiner and Huges, “Computer Graphics: Principles and Practice”, Third Edition, Addison-Wesley Professional, 2013.

U14ITTE23 TCP/IP AND SOCKET PROGRAMMING

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Demonstrate systematic and critical understanding of the theories, principles and practices of internetworking protocols

CO2: Identify the issues that are driving the development of new protocols to broaden and enhance the operation of the internet

CO3: Design a sub network for an organization based on its requirement

CO4: Analyze mechanisms to improve the performance of network protocols.

CO5: Build client server applications using network programming constructs on Unix Platform

Pre-requisite:

1. U14ITT504-Computer Networks

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M											
CO3	M											S
CO4		M										M
CO5		S										M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

ELEMENTARY TCP SOCKETS **5 Hours**

Introduction to Sockets – Socket Address Structures – Byte Ordering Functions – Byte Manipulation Functions – Elementary TCP Sockets – Socket, Connect, Bind, Listen, Accept, Read, Write, Close Functions – Iterative Server – Concurrent Server.

APPLICATION DEVELOPMENT **10 Hours**

TCP Echo Server – TCP Echo Client – UDP Echo Server – UDP Echo Client – Server with Multiple Clients – Boundary Conditions: Server Process Crashes - Server Host Crashes - Server Crashes and Reboots - Server Shutdown – I/O multiplexing – I/O Models – Select Function – Shutdown Function – Poll Function.

ELEMENTARY NAME & ADDRESS CONVERSIONS **6 Hours**

Domain Name System – gethostbyname Function – gethostbyaddr Function – getservbyname and getservbyport Functions. IPV4 AND IPV6 Interoperability.

INTERNET PROTOCOLS – I **12 Hours**

Internetworking Concept and Architectural Model – Mapping Internet Addresses to Physical Addresses (ARP) - Determining an Internet Address at Startup (RARP) - Internet Protocol: Connectionless Datagram Delivery - Internet Protocol: Routing IP Datagrams - Internet Protocol: Error and Control messages (ICMP) – Classless Addressing (Supernetting) – The Effect of Supernetting on Routing – CIDR Address Blocks and Bit Masks – Address Blocks and CIDR Notation.

INTERNET PROTOCOLS – II **12 Hours**

Reliable Stream Transport Service (TCP) – Timeout and Retransmission – Accurate Measurement of Round Trip Samples - Karn's Algorithm and Timer Backoff – Establishing a TCP Connection – Closing a TCP Connection – TCP Connection Reset – TCP State Machine – Silly Window Syndrome and Small Packets – Avoiding Silly Window Syndrome - Internet Multicasting -Internet Group Management Protocol (IGMP) - IGMP Implementation - Group Membership State Transitions -IGMP Message Format - Auto configuration (DHCP) - IPv6 : Features of IPv6- General form of an IPv6 Datagram - IPv6 Base Header Format - IPv6 Extension Headers - Parsing an IPv6 Datagram - IPv6 Fragmentation and Reassembly -The Consequence of End to End Fragmentation - IPv6 Source Routing - IPv6 options.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff "Unix Network Programming, Volume 1: The Sockets Networking API", Third Edition, Addison Wesley, 2003.
2. Comer D.E., "Internetworking with TCP/IP Vol-I (Principles, Protocols and Architectures)", Fourth Edition, PHI, 2003.
3. Comer D.E., Stevens D.L., "Internetworking with TCP/IP Volume II: Design, Implementation, and Internals", Third edition, PHI, 1999.
4. Comer D.E., "Internetworking with TCP/IP Vol- III", (BSD Sockets Version), Second edition, PHI, 2003.
5. Behrouz A. Forouzan, "TCP / IP Protocol Suite", Third edition, Tata McGraw Hill, 2005.

U14ITTE24 INFORMATION CODING TECHNIQUES

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Describe about information, entropy and classify the coding schemes.

CO2: Demonstrate the coding schemes for text.[

CO3: Describe and classify the compression schemes for video and image.

CO4: Utilize various types of error control codes.

CO5: Construct the code tree and state diagram for error control codes

Pre-requisite:

1. U14MAT506-Probability and Queuing Theory

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
CO2	M	M										W
CO3	M	M										W
CO4	M	M	W									M
CO5	M	M	W									M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INFORMATION THEORY 9 Hours

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

SOURCE CODING: TEXT, AUDIO AND SPEECH **9 Hours**

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

SOURCE CODING: IMAGE AND VIDEO **9 Hours**

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

ERROR CONTROL CODING: BLOCK CODES **9 Hours**

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

ERROR CONTROL CODING: CONVOLUTIONAL CODES **9 Hours**

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

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Simon Haykin, “Communication Systems”, fourth edition, John Wiley & Sons, 2008.
2. Bose.R, “Information Theory, Coding And Cryptography”, TMH 2007
3. Fred Halsall, “Multimedia Communications: Applications, Networks, Protocols And Standards”, Pearson Education Asia, 2002
4. Sayood. K, “Introduction To Data Compression”, Third edition, Elsevier, 2006.
5. Gravano. S, “Introduction To Error Control Codes”, Oxford University Press, 2007

ELECTIVES FOR SEVENTH SEMESTER

U14ITTE31 BUSINESS PROCESS MODELS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Summarize the principles of organizational strategy and process design.

CO2: Explain the role of IT in BPM.

CO3: Analyze the performance of existing processes and identify process improvement.

CO4: Predict business solutions in written and verbal forms for process innovation and redesign projects.

CO5: Create a BPM implementation strategy and implementation plan for an organization

Pre-requisite:

1. U14ITT502-Software Engineering

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	W										
CO2	M	W										
CO3	M	M								M		
CO4	M	M			M							
CO5	M	M			M							

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar/Projects	1. Course Exit Survey

INTRODUCTION **9 Hours**

Introduction –Views on quality –Cost of quality -Quality models –Quality frameworks – Verification and Validation –Defect taxonomy –Defect management –Statistics and measurements -IEEE standards –Quality assurance and control processes

VERIFICATION 6 Hours

Introduction –Verification techniques –Inspections, reviews, walkthroughs –Case studies

TEST GENERATION 12 Hours

Software testing-Validation –Test plan –Test cases -Test Generation –Equivalence partitioning– Boundary value analysis –Category partition method –Combinatorial generation –Decision tables –Examples and Case studies

STRUCTURAL TESTING 12 Hours

Introduction –Test adequacy criteria –Control flow graph –Coverage's: block, conditions, multiple conditions, MC/DC, path –Data flow graph –Definition and use coverage's –C-use, P-use, Defclear-Def-use –Finite state machines
–Transition coverage –Fault based testing –Mutation analysis -Case studies.

SOFTWARE QUALITY ASSURANCE STANDARDIZATION 9 Hours

Software Standards–ISO 9000 Quality System Standards - Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM Level 5 – Comparison of ISO 9000 Model with SEI's .

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Boriz Beizer, "Software Testing Techniques", 2nd Edition, DreamTech, 2009.
2. Stephen H. Khan, "Metrics And Models In Software Quality Engineering", Second edition, Pearson Education, 2004
3. P. Mathur, "Foundations of Software Testing", Pearson, 2008
4. Mauro Pezze and Michal Young, "Software Testing and Analysis. Process,Principles, and Techniques", John Wiley 2008
5. Mordechai Ben-Menachem / Garry S Marliss, "Software Quality", Vikas Publishing House, Pvt, Ltd., New Delhi.

U14ITTE32 BUILDING ENTERPRISE APPLICATIONS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Interpret the role of various phases involved in ERP application

CO2: Explain the functionality of various layers associated with enterprise application

CO3: Demonstrate the need of various testing techniques involved in enterprise applications

CO4: Identify the role of SOA in enterprise

CO5: Explain the concepts & technology for service orchestration and the guidelines to integrate a Business Process Management Solution in an Enterprise SOA

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
CO2	M	W			W							
CO3	M	M			W							
CO4	M	W										
CO5	M	W										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4.Seminar	1. Course Exit Survey

INTRODUCTION & PHASES OF ERP 9 Hours

Introduction to enterprise applications and their types- software engineering methodologies- life cycle of raising an enterprise application- introduction to skills required to build an enterprise application.

Inception of enterprise applications- enterprise analysis- business modeling- requirements elicitation- use case modeling- prototyping- non functional requirements- requirements validation- planning and estimation

LAYERS IN ERP ARCHITECTURE-I 9 Hours

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

TESTING AND ROLLING OUT AN ENTERPRISE APPLICATION 9Hours

Methodologies of code review- static code analysis- build and testing- dynamic code analysis – code profiling and code coverage .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

SERVICE-ORIENTED ARCHITECTURE FOR ENTERPRISE APPLICATIONS-I 9 Hours

Software architecture-SOA-Enterprise wide SOA-Enterprise applications-Software platform for enterprise applications

SERVICE-ORIENTED ARCHITECTURE FOR ENTERPRISE APPLICATIONS-II 9 Hours

Service Oriented Enterprise Applications - Service Oriented Analysis and Design - Technologies for SOA- Business Case for SOA - SOA Implementation and Governance - Trends in SOA

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Anubhav Pradhan, Satheesha B. Nanjappa, Senthil K. Nallasamy, Veerakumar Esakimuthu “Raising Enterprise Applications”, John Wiley, April 2010.
2. Shankar Kambhampaty,Service-oriented Architecture For Enterprise And Cloud Applications , 2nd Edition,Wiley India Pvt. Ltd,2010
3. Brett McLaughlin, “Building Java Enterprise Applications”, O'Reilly Media, March 2002.
4. Alexis Leon, “ERP Demystified”, Second Edition, Tata McGraw Hill, New Delhi, 2008.
5. Soren Lauesen, “Software Requirements: Styles & Techniques”, Addison-Wesley Professional, 2002.
6. Inderjeet Singh, Mark Johnson, Beth Stearns, “Designing Enterprise Applications with the J2EE Platform”, second edition, Pearson Education, 2002.

U14GST002 TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: - Understand quality concepts and philosophies of TQM

CO2 - Apply TQM principles and concepts of continuous improvement

CO3- Apply and analyze the quality tools, management tools and statistical fundamentals to improve quality

CO4 - Understand the TQM tools as a means to improve quality

CO5 - Remember and understand the quality systems and procedures adopted

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M									W		
CO2		M	M									
CO3					M							
CO4					M							
CO5	W							S				

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4.Seminar	1. Course Exit Survey

INTRODUCTION **9 Hours**

Definition of Quality, Dimensions of Quality, Quality costs, Top Management Commitment, Quality Council, Quality Statements, Barriers to TQM Implementation, Contributions of Deming, Juran and Crosby, Team Balancing

TQM PRINCIPLES **9 Hours**

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Continuous Process Improvement,5S, Kaizen, Just-In-Time and TPS

STATISTICAL PROCESS CONTROL **9 Hours**

The seven tools of quality, New seven Management tools, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Concept of six sigma.

TQM TOOLS **9 Hours**

Quality Policy Deployment (QPD), Quality Function Deployment (QFD), Benchmarking, Taguchi Quality Loss Function, Total Productive Maintenance (TPM), FMEA

QUALITY SYSTEMS **9 Hours**

. Need for ISO 9000 and Other Quality Systems, ISO 9001:2008 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, ISO 14001:2004

Theory: 45 Hrs **Total Hours: 45**

REFERENCES

1. Dale H.Besterfiled, "Total Quality Management", Pearson Education
2. James R.Evans & William M.Lidsay, "The Management and Control of Quality", South-Western (Thomson Learning), 2008.
3. Feigenbaum.A.V. "Total Quality Management", McGraw Hill
4. Oakland.J.S. "Total Quality Management", Butterworth – Hcinemann Ltd., Oxford
5. Narayana V. and Sreenivasan, N.S. "Quality Management – Concepts and Tasks", New Age International 2007.
6. Zeiri. "Total Quality Management for Engineers", Wood Head Publishers.

U14GST004 OPERATIONS RESEARCH

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Apply linear programming model and assignment model to domain specific situations

CO1: Analyze the various methods under transportation model and apply the model for testing the closeness of their results to optimal results

CO2: Apply the concepts of PERT and CPM for decision making and optimally managing projects

CO3: Analyze the various replacement and sequencing models and apply them for arriving at optimal decisions

CO4: Analyze the inventory and queuing theories and apply them in domain specific situations.

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S										
CO2		S										
CO3	M	M				M						
CO4		S										
CO5	M	S										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. Assignment 3. Seminar 4. End Semester Exam	

LINEAR MODEL **9 Hrs**

The phases of OR study – formation of an L.P model – graphical solution – simplex algorithm – artificial variables technique (Big M method, two phase method), duality in simplex.

TRANSPORTATION AND ASSIGNMENT MODELS **9 Hrs**

Transportation model – Initial solution by North West corner method – least cost method – VAM. Optimality test – MODI method and stepping stone method.

Assignment model – formulation – balanced and unbalanced assignment problems.

PROJECT MANAGEMENT BY PERT & CPM **9 Hrs**

Basic terminologies – Constructing a project network – Scheduling computations – PERT - CPM – Resource smoothening, Resource leveling, PERT cost.

REPLACEMENT AND SEQUENCING MODELS **9 Hrs**

Replacement policies - Replacement of items that deteriorate with time (value of money not changing with time) – Replacement of items that deteriorate with time (Value of money changing with time) – Replacement of items that fail suddenly (individual and group replacement policies).

Sequencing models- n job on 2 machines – n jobs on 3 machines – n jobs on m machines, Traveling salesman problem.

INVENTORY AND QUEUING THEORY **9 Hrs**

Variables in inventory problems, EOQ, deterministic inventory models, order quantity with price break, techniques in inventory management.

Queuing system and its structure – Kendall's notation – Common queuing models - M/M/1: FCFS/∞/∞ - M/M/1: FCFS/n/∞ - M/M/C: FCFS/∞/∞ - M/M/1: FCFS/n/m

Theory: 45 Hrs **Total Hours: 45**

References:

1. Taha H.A., "Operation Research", Pearson Education
2. Hira and Gupta "Introduction to Operations Research", S.Chand and Co.2002
3. Hira and Gupta "Problems in Operations Research", S.Chand and Co.2008
4. Wagner, "Operations Research", Prentice Hall of India, 2000
5. S.Bhaskar, "Operations Research", Anuradha Agencies, Second Edition, 2004

U14GST005 ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT

L	T	P	C
3	0	0	3

Course outcomes:

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

CO1: Evaluate the economic theories, cost concepts and pricing policies
CO2: Understand the market structures and integration concepts
CO3: Understand the measures of national income, the functions of banks and concepts of globalization
CO4: Apply the concepts of financial management for project appraisal
CO5: Understand accounting systems and analyze financial statements using ratio analysis

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						W			W		S	W
CO2						W			W		S	W
CO3						W			W		S	W
CO4						W			W		S	W
CO5						W			W		S	W

Course assessment methods:

Direct	Indirect
1. Internal tests 2. Assignments 3. End Semester Exam	Course End Survey

ECONOMICS, COST AND PRICING CONCEPTS 9 Hours

Economic theories – Demand analysis – Determinants of demand – Demand forecasting – Supply – Actual cost and opportunity cost – Incremental cost and sunk cost – Fixed and variable cost – Marginal costing – Total cost – Elements of cost – Cost curves – Breakeven point and breakeven chart – Limitations of break even chart – Interpretation of break even chart – Contribution – P/V-ratio, profit-volume ratio or relationship – Price fixation – Pricing policies – Pricing methods

CONCEPTS ON FIRMS AND MANUFACTURING PRACTICES **9 Hours**

Firm – Industry – Market – Market structure – Diversification – Vertical integration – Merger – Horizontal integration

NATIONAL INCOME, MONEY AND BANKING, ECONOMIC ENVIRONMENT **9 Hours**

National income concepts – GNP – NNP – Methods of measuring national income – Inflation – Deflation – Kinds of money – Value of money – Functions of bank – Types of bank – Economic liberalization – Privatization – Globalization

CONCEPTS OF FINANCIAL MANAGEMENT **9 Hours**

Financial management – Scope – Objectives – Time value of money – Methods of appraising project profitability – Sources of finance – Working capital and management of working capital

ACCOUNTING SYSTEM, STATEMENT AND FINANCIAL ANALYSIS **9 Hours**

Accounting system – Systems of book-keeping – Journal – Ledger – Trail balance – Financial statements – Ratio analysis – Types of ratios – Significance – Limitations

Theory: 45 Hrs **Total Hours: 45**

REFERENCES

1. Prasanna Chandra, " Financial Management (Theory & Practice) TMH
2. Weston & Brigham, " Essentials of Managerial Finance"
3. Pandey, I. M., "Financial Management"
4. Fundamentals of Financial Management- James C. Van Horne.
5. Financial Management & Policy -*J*ames C. Van Horne
6. Management Accounting & Financial Management- M. Y. Khan & P. K. Jain
7. Management Accounting Principles & Practice -P. Saravanavel

U14GST008 FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Analyze various global trends and decide on the scope of a new product

CO2: Outline the product development methodologies and management.

CO3: Develop product management plan for a new product based on the type of the new product and development methodology

CO4: Summarize requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification

CO5: Conceptualize new product integrating the hardware, software, controls, electronics and mechanical systems.

CO6: Develop test specifications and coordinate the respective activities with testing group, validate the product and confirm its performance as per design specification.

CO7: Develop product documentation as required.

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			M	W	S				M			
CO2			W								S	
CO3			S								S	
CO4			M		S							
CO5					S							
CO6			S						M			
CO7									M	S		

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar 5.Mini Project	1. Course Exit Survey

FUNDAMENTALS OF PRODUCT DEVELOPMENT 9 Hours

Global Trends Analysis and Product decision: Types of various trends affecting product decision - Social Trends (Demographic, Behavioral, Psychographic), Technical Trends (Technology, Applications, Tools, Methods), Economical Trends (Market, Economy, GDP, Income Levels, Spending Pattern, target cost, TCO), Environmental Trends (Environmental Regulations and Compliance), Political/Policy Trends (Regulations, Political Scenario, IP Trends and Company Policies); PESTLE Analysis

Introduction to Product Development Methodologies and Management: Overview of Products and Services (Consumer product, Industrial product, Specialty products etc); Types of Product Development (NPD/ Re-Engineering (Enhancements, Cost Improvements)/ Reverse Engineering/ Design Porting & Homologation); Overview of Product Development methodologies (Over the Wall/ Waterfall/ V-Model/ Stage-Gate Process/ Spiral/Systems Engineering/ Agile); Product Life Cycle (S- Curve, Reverse Bathtub Curve); Product Development Planning and Management (Budgeting, Risk, Resources and Design Collaboration, Scheduling, Change Management, Product Cost Management).

REQUIREMENTS AND SYSTEM DESIGN 9 Hours

Requirement Engineering: Types of Requirements (Functional, Performance, Physical, Regulatory, Economical, Behavioral, Technical, Stakeholder, Environmental, Industry specific, Internal-Company Specific); Requirement Engineering (Gathering (VOC), Analysis (QFD), Design Specification); Traceability Matrix and Analysis; Requirement Management .**System Design & Modeling:** Introduction to System Modeling; System Optimization; System Specification; Sub-System Design; Interface Design.

DESIGN AND TESTING 9 Hours

Conceptualization: Industrial Design and User Interface Design; Introduction to Concept generation Techniques; Concept Screening & Evaluation - Concept Design, S/W Architecture, Hardware Schematics and simulation.

Detailed Design: Component Design and Verification; High Level Design/Low Level Design of S/W Programs, S/W Testing; Hardware Schematic, Component design, Layout and Hardware Testing. **Prototyping:** Types of Prototypes (Mockups, Engineering Assessment Prototype, Alpha, Beta, Gama); Introduction to Rapid Prototyping and Rapid Manufacturing. **System Integration, Testing, Certification and Documentation:** Manufacturing/Purchase and Assembly of Systems; Integration of Mechanical, Embedded and S/W systems; Introduction to Product verification processes and stages – Industry specific (DFMEA, FEA, CFD); Introduction to Product validation processes and stages - Industry specific (Sub-system Testing/ Integration Testing/ Functional Testing/ Performance Testing / Compliance Testing); Product Testing standards and Certification – Industry specific; Product Documentation (Compliance Documentation, Catalogue, Brochures, user manual, maintenance Manual, Spares Parts List, Warranty, Disposal Guide, IETMS, Web Tools).

SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9 Hours

Sustenance: Maintenance and Repair; Enhancements. **Product EoL:** Obsolescence Management; Configuration Management; EoL Disposal.

BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY **9 Hours**

The Industry: Engineering Services Industry – Overview; Product development in Industry versus Academia.

The IPD Essentials: Introduction to vertical specific product development processes; Product development Trade-offs; Intellectual Property Rights and Confidentiality; Security and Configuration management.

Theory: 45 Hrs **Total Hours: 45**

REFERENCES

1. Foundation Skills in Integrated Product Development (FSIPD), I st Edition, 2013, Published by NASSCOM.

2. Ulrich, Karl T. and Eppinger, Steven D (2004) Product Design and Development, 5th Edition, McGraw-Hill, 2012.

3. Kevin N. Otto, "Product design – Techniques in Reverse Engineering and New Product Development", PEARSON, New Delhi, 2011

U14ITTE41 HIGH SPEED NETWORKS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Summarize the mechanisms to provide high speed networking through case studies of ATM and frame relay networks

CO2: Construct queuing system with different arrival and service rates

CO3: Analyze the performance of various congestion control and admission control mechanisms.

CO4: Analyze various QoS parameters needed for real time traffic.

CO5: Explain the protocols needed for QoS support.

Pre-requisite:

1. U14ITT504 - Computer Networks.

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	S				W							
CO3	M											M
CO4	M										S	
CO5	M											

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

HIGH PERFORMANCE NETWORKS 9 Hours

Frame Relay Networks – Asynchronous Transfer Mode – Asynchronous Transfer Mode (ATM) Protocol Architecture - ATM Logical Connection - ATM Cell – ATM Service Categories – ATM Adaptation Layer (AAL) - High Speed LANs: Fast Ethernet - Gigabit Ethernet - Fiber Channel.

QUEUING MODELS AND CONGESTION MANAGEMENT 8 Hours

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks

ATM CONGESTION CONTROL 12 Hours

Performance of TCP over ATM - Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame Work - Traffic Control – Available Bit Rate (ABR) Traffic Management – ABR Rate Control - Resource Management (RM) Cell Formats - ABR Capacity Allocations.

INTEGRATED AND DIFFERENTIATED SERVICES 8 Hours

Integrated Services Architecture – Approach - Components - Services - Queuing Discipline - Fair Admission Control - Traffic Shaping - Resource Reservation Queuing (FQ) - Processor Sharing (PS) - Bit-Round Fair Queuing (BRFQ) - Generalized Processor Sharing (GPS) - Weighted Fair Queuing (WFQ) – Random Early Detection - Differentiated Services DS code points – Per Hop Behavior

PROTOCOLS FOR QOS SUPPORT 8 Hours

Resource Reservation (RSVP) – Goals & Characteristics - Data Flow - RSVP operations - Protocol Mechanisms – Multiprotocol Label Switching – Operations - Label Stacking - Protocol details – Real Time Protocol (RTP) – Protocol Architecture - Data Transfer Protocol - Real Time Control Protocol (RTCP).

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. William Stallings, “High Speed Networks and Internet”, Second edition, Pearson Education, 2002.
2. Warland & Pravin Varaiya, “High Performance Communication Networks”, Second edition, Jean Harcourt Asia Pvt. Ltd., 2001.
3. Irvan Pepelnjk, et al “MPLS and VPN architecture”, Cisco Press, Volume 1 and 2, 2003.

U14ITTE42 AD HOC AND SENSOR NETWORKS

L	T	P	C
3	0	0	3

Course Outcomes (COs):

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

CO1	Explain the concept of ad hoc and sensor networks, their applications and typical node and network architectures.	K2
CO2	Compare wireless routing protocol's function and their implications on network performance.	K3
CO3	Explain various security threats to ad hoc networks and describe proposed solutions.	K2
CO4	Explain the sensor network characteristics, sensor databases and query processing.	K2

Pre-requisite: Computer Networks, Mobile & Pervasive Computing

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M					M						
CO2	M	M										
CO3	M											
CO4	M			M								M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. Model Exam 3. Case Study – Sensor Networks	1. Course Exit Survey

INTRODUCTION 9 Hours

Characteristics of wireless channel - Wireless local loop - IEEE 802.16 standard – HIPERACCESS -Ad hoc wireless networks: Introduction and issues - MAC protocols: Design issues - Goals and classification - MACAW: A media access protocol for wireless LANs- Distributed packet reservation multiple access protocol-Distributed priority scheduling and Medium access in Ad hoc networks- MAC protocol using directional antennas.

ROUTING PROTOCOLS 9 Hours

Design issues – Classification – Wireless routing protocol - Location aided routing- Zone routing protocol - Hierarchical state routing protocol - Power aware routing protocol – Operation of multicast routing protocols - Classification of multicast routing protocols – Application-Dependent multicast routing.

SECURITY IN AD HOC NETWORKS 9 Hours

Security in ad hoc wireless networks – Network security requirements - Issues and challenges in security provisioning – Network security attacks – key management – secure routing in Ad hoc networks.

WIRELESS SENSOR NETWORKS 9 Hours

Architecture - Data dissemination - Date gathering - MAC protocols - Location discovery - Quality of sensor networks - Case study

SENSOR NETWORK DATABASE 9 Hours

Sensor database challenges – Querying the physical environment – Query interfaces - High level database organization – In-Network aggregation – Temporal data – Emerging Applications.

Theory: 45 hours **Tutorial: 0 hour** **Total hours:45**

REFERENCES

1. Siva Ram Murthy. C and Manoj B.S, "Ad hoc Wireless Networks: Architectures And Protocols ", Prentice Hall PTR, 2004
2. Toh C.K., "Ad hoc Mobile Wireless Networks: Protocols And Systems", Prentice Hall PTR, First edition 2002
3. Mohammad Ilyas, "The Handbook Of Ad hoc Wireless Networks", CRC press, 2002
4. Charles E. Perkins, "Ad hoc Networking", Addison –Wesley,2000
5. Stefano Basagni , et al " Mobile Ad hoc Networking", Wiley –IEEE press,2004
6. Zhao, Guibas "Wireless Sensor Networks" ,Morgan Kaufmann Publications,2004

U14ITTE43 INTERNET OF THINGS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Understand the components and protocol in internet

CO2: Design a portable IOT using appropriate board

CO3: Develop schemes for the applications of IOT in real time scenarios

CO4: Understand the cloud and internet environment

CO5: Model the internet of things to business

Pre-requisite :

1. U14ITT504-Computer Networks

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	W										M
CO2	S	M			M				M	W		W
CO3	S	M			M				M	W		
CO4	M	M										W
CO5	M	M										W

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INTRODUCTION 9 Hours

Definition – phases – Foundations – Policy– Challenges and Issues - identification - security – privacy. Components in internet of things**:** Control Units – Sensors – Communication modules – Power Sources – Communication Technologies – RFID – Bluetooth – Zigbee – Wifi – Rflinks – Mobile Internet – Wired Communication

PROGRAMMING THE MICROCONTROLLER FOR IOT 9 Hours

Basics of Sensors and actuators – examples and working principles of sensors and actuators – Cloud computing and IOT – Arduino/Equivalent Microcontroller platform – Setting up the

board - Programming for IOT – Reading from Sensors

Communication: Connecting microcontroller with mobile devices – communication through bluetooth and USB – connection with the internet using wifi / ethernet

RESOURCE MANAGEMENT IN THE INTERNET OF THINGS 9 Hours

Clustering - Software Agents - Data Synchronization - Clustering Principles in an Internet of Things Architecture - The Role of Context - Design Guidelines -Software Agents for Object - Data Synchronization- Types of Network Architectures - Fundamental Concepts of Agility and Autonomy-Enabling Autonomy and Agility by the Internet of Things-Technical Requirements for Satisfying the New Demands in Production - The Evolution from the RFID-based EPC Network to an Agent based Internet of Things- Agents for the Behaviour of Objects

BUSINESS MODELS FOR THE INTERNET OF THINGS 9 Hours

The Meaning of DiY in the Network Society- Sensor-actuator Technologies and Middleware as a Basis for a DiY Service Creation Framework - Device Integration - Middleware Technologies Needed for a DiY Internet of Things Semantic Interoperability as a Requirement for DiY Creation -Ontology- Value Creation in the Internet of Things-Application of Ontology Engineering in the Internet of Things-Semantic Web-Ontology - The Internet of Things in Context of EURIDICE - Business Impact

FROM THE INTERNET OF THINGS TO THE WEB OF THINGS 9 Hours

Resource-oriented Architecture and Best Practices- Designing RESTful Smart Things - Web-enabling Constrained Devices - The Future Web of Things - Set up cloud environment – send data from microcontroller to cloud – Case study: CAM Cloud Assisted Privacy– Other recent projects

Theory : 45 Hrs **Total Hours:45**

REFERENCES

1. Charalampos Doukas , “Building Internet of Things with the Arduino”, Create space, April 2002.
2. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011.
3. Luigi Atzor et.al, “The Internet of Things: A survey”, Journal on Networks, Elsevier Publications, October, 2010.
4. Huang Lin, Gainesville, Jun Shao, Chi Zhang,Yuguang Fang, “CAM: Cloud-Assisted Privacy Preserving Mobile Health Monitoring”, IEEE Transactions on Information Forensics and Security, 2013.
5. Pengwei Hu; Fangxia Hu, “An optimized strategy for cloud computing architecture”, 3rd IEEE Transactions on Computer Science and Information Technology (ICCSIT), 2010

U14ITTE51 MULTIMEDIA SYSTEMS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Explain the architecture and issues for distributed multimedia systems

CO2: Apply various compression techniques for images and videos

CO3: Describe a multimedia systems framework

CO4: Model a simple multimedia application

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	S											
CO3	M											
CO4	S				S		S			S		

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Mini Project	1. Course Exit Survey

USES OF MULTIMEDIA INFORMATION **9 Hours**

Multimedia and Personalized Computing - Multimedia Systems: The Challenges. Architectures and Issues for Distributed Multimedia Systems: Distributed Multimedia Systems – Synchronization - Orchestration - and QOS Architecture – The Role of Standard - A Framework For Multimedia Systems.

Digital Representation of Sound – Transmission of Digital Sound - Digital Audio Signal Processing -Digital Music Making – Brief Survey of Speech Recognition and Regeneration – Digital Audio and the Computer – Video Technology.

DIGITAL VIDEO AND IMAGE COMPRESSION **9 Hours**

Evaluating a Compression System – Redundancy and Visibility – Video Compression Techniques –JPEG Image Compression Standard – The MPEG Motion Video Compression

Standard – DVI Technology - Middleware System Services Architecture – Goals of Multimedia System Service Architecture – Media Stream Protocol - Multimedia Device Presentation Service and User Interface - Multimedia Services and the Window System - Client Control of Continuous Media - Device Control - Temporal Coordination and Composition - Tool Kits - Hyper Applications.

MULTIMEDIA FILE SYSTEMS AND INFORMATION MODELS 9 Hours

The Case for Multimedia Information Systems – File System Support for Continuous Media – Data Models for Multimedia and Hypermedia Information - Multimedia Presentation and Authoring: Current State of the Industry – Design Paradigms and User Interface – Barriers to Widespread Use.

MULTIMEDIA COMMUNICATIONS SYSTEMS 9 Hours

Multimedia Services over the Public Network: Requirements, Architecture and Protocols – Applications – Network services – Network Protocols- Multimedia Interchange: Quick Time Movie File (QMF) Format – MHEG (Multimedia and Hypermedia Information Encoding Expert Group) – Format Function and Representation Summary – Real-Time Interchange - Multimedia Conferencing: Teleconferencing Systems – Requirements for Multimedia Communications – Shared Application Architectures and Embedded Distributed Objects – Multimedia Conferencing Architectures.

MULTIMEDIA GROUPWARE 9 Hours

Seams and Design Approaches – Architecture of Team Workstation – Experimental use of Team WorkStation - Nomenclature – Video versus Computing – HDTV, ATV, EDTV, IDTV – Standardization Issues - Knowledge–based Multimedia Systems – Problems Facing Multimedia Systems – The Anatomy of an Intelligent Multimedia System – Virtual Reality: architecture - technology.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. John. F. Koegel Buford, “Multimedia Systems”, Pearson Education, 2002.
2. Nigel Chapman and Jenny Chapman, “Digital Multimedia”, Third Edition, John Wiley & Sons, 2009.
3. Prabhat K.Andleigh, Kiran Thakrar , “Multimedia Systems Design”, PHI, 2013.
4. Tay Vaughan, “Multimedia: Making It Work”, TMH, 2010.
5. Roy S Kalawsky, “The Science of Virtual Reality and Virtual Environments”, Addison Wesley, 1993.

U14ITTE52 SOFTWARE QUALITY ASSURANCE AND TESTING

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Appreciate the importance of software quality assurance

CO2: Apply software testing techniques for information systems development.

CO3: Know the inputs and deliverables of testing process

CO4: Demonstrate activities in software project management.

CO5: Interpret the importance of software quality assurance

Pre-requisite :

1. U14ITT502-Software Engineering

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M											
CO3	M									M		W
CO4	M									M		W
CO5	M											

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INTRODUCTION **9 Hours**

Introduction –Views on quality –Cost of quality -Quality models –Quality frameworks – Verification and Validation –Defect taxonomy –Defect management –Statistics and measurements -IEEE standards –Quality assurance and control processes

VERIFICATION **6 Hours**

Introduction –Verification techniques –Inspections, reviews, walkthroughs –Case studies

TEST GENERATION **12 Hours**

Software testing-Validation –Test plan –Test cases -Test Generation –Equivalence partitioning–Boundary value analysis –Category partition method –Combinatorial generation –Decision tables –Examples and Case studies

STRUCTURAL TESTING **12 Hours**

Introduction –Test adequacy criteria –Control flow graph –Coverage's: block, conditions, multiple conditions, MC/DC, path –Data flow graph –Definition and use coverage's –C-use, P-use, Defclear-Def-use –Finite state machines –Transition coverage –Fault based testing –Mutation analysis -Case studies.

SOFTWARE QUALITY ASSURANCE STANDARDIZATION **9 Hours**

Software Standards–ISO 9000 Quality System Standards - Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM Level 5 – Comparison of ISO 9000 Model with SEI's .

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Boriz Beizer, "Software Testing Techniques", 2nd Edition, DreamTech, 2009.
2. Stephen H. Khan, "Metrics And Models In Software Quality Engineering", Second edition, Pearson Education, 2004
3. P. Mathur, "Foundations of Software Testing", Pearson, 2008
4. Mauro Pezze and Michal Young, "Software Testing and Analysis. Process, Principles, and Techniques", John Wiley 2008
5. Mordechai Ben-Menachem / Garry S Marliss, "Software Quality", Vikas Publishing House, Pvt, Ltd., New Delhi.

U14ITTE53 REAL TIME SYSTEMS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Apply the knowledge of operating system concepts to understand real time system concepts like tasks and scheduling.

CO2: Analyze the various parameters related to the different types of scheduling in single processor and multiprocessor environments.

CO3: Understand the various protocols for effective resource sharing.

CO4: Understand the Real Time database control concepts and fault tolerant techniques.

Pre-requisite :

1. U14ITT401-Microprocessors and Microcontroller
2. U14ITTE13-Embedded Systems

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
CO2	S				M							M
CO3	S							M				M
CO4	S											
CO5	S		M									

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INTRODUCTION TO REAL TIME SYSTEM **7 Hours**

Typical RT applications - Hard and soft Real Time constraining - Hard and soft RTS - Reference modeling RTS - Issues in RTS - Structure of RTS

REAL TIME SCHEDULING **12 Hours**

Task, processes, processors - Task allocation algorithm - Single processor and multi processor scheduling - Clock driven and priority based scheduling algorithm

TIMING ANALYSIS AND RESOURCE CONTROL 12 Hours

Prediction of Execution Time - Worst Case Execution Time(WCET) analysis – Assumptions on Resources and Their Usage – Resource Contention and Resource Access Control – Priority Ceiling Protocol – Priority Inheritance Protocol – Stack Based Priority Ceiling Protocol – Preemption Ceiling Protocol.

REAL TIME DATABASE AND FAULT TOLERANT TECHNIQUES 9 Hours

Transaction priority and concurrency control issues - Disk scheduling - Fault type and Detection Techniques - Redundancy management – Integration issues

REAL TIME SYSTEM CASE STUDIES 5 Hours

Examples of Hard, Soft and Firm real time systems like automatic chocolate vending machine, Smart Card and Adaptive Cruise Control System in a car or flight.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Jane .W. S. Liu, "Real Time Systems", Pearson Education 2000.
2. Krishna .C.M, "Real Time Systems", Mc-Graw Hill Publication, 1997.
3. Prasad K.V.K.K, "Embedded/Real-Time Systems: Concepts, Design and Programming",Dream Tech Press, Reprint, 2009.
4. Sriram V Iyer , Pankaj Gupta, "Embedded Real Time Systems Programming", Tata McGraw Hill, 2010.

U14ITTE54 COMPUTATIONAL INTELLIGENCE

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Discuss about the basics of computational Intelligence and Application areas

CO2: Explain the basics of Evolutionary Computation.

CO3: Illustrate the Genetic Algorithms and Swarm Intelligence Techniques

CO4: Describe the theory and applications of Neural Networks

CO5: Explain about Fuzzy logic and the implementation of Fuzzy systems and performance metrics

Pre-requisite :

1. U14CST601-Artificial Intelligence
2. U14MAT308-Discrete Mathematics
3. U14ITT404-Design and Analysis of Algorithms

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M											
CO3	M	M								W		W
CO4	M											
CO5	M											

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

COMPUTATIONAL INTELLIGENCE **9 Hours**

Myths about Computational Intelligence- Computational Intelligence Application Areas- Adaptation- Self-organization and Evolution- Historical Views of Computational Intelligence- Computational Intelligence as Adaptation and Self-organization- Computational Intelligence and Soft Computing versus Artificial Intelligence and Hard Computing

EVOLUTIONARY COMPUTATION CONCEPTS AND PARADIGMS — 9 Hours

History of Evolutionary Computation- Evolutionary Computation Overview- Genetic Algorithms- Evolutionary Programming- Evolution Strategies- Genetic Programming- Particle Swarm Optimization

NEURAL NETWORK CONCEPTS AND PARADIGMS — 9 Hours

Biological Basis for Neural Networks- Neural Network History- What Neural Networks Are and Why They Are Useful - Neural Network Components and Terminology- Neural Network Topologies- Neural Network Adaptation- Comparing Neural Networks and Other Information Processing Methods- Preprocessing- Post processing

FUZZY SYSTEMS CONCEPTS AND PARADIGMS — 9 Hours

History -Fuzzy Sets and Fuzzy Logic- The Theory of Fuzzy Sets- Approximate Reasoning- Developing a Fuzzy Controller

COMPUTATIONAL INTELLIGENCE IMPLEMENTATIONS AND PERFORMANCE METRICS — 9 Hours

Implementation Issues-Fuzzy Evolutionary Fuzzy Rule System Implementation-Choosing the Best Tools-Applying Computational Intelligence to Data Mining- Performance Metrics - General Issues- Percent Correct- Average Sum-squared Error- Absolute Error - Normalized Error - Evolutionary Algorithm Effectiveness Metrics- Mann–Whitney U Test - Receiver Operating Characteristic Curves - Recall and Precision- Other ROC-related Measures- Confusion Matrices - Chi-square Test

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Russell Eberhart et al. “Computational Intelligence–Concepts to Implementations”, Morgan Kaufmann Publishers, 2007
2. Sivanandam S.N and Deepa S.N., “Principles of Soft Computing”, First edition, Wiley India (P) Ltd, 2007.
3. Simon Haykin, “Neural Networks, A Comprehensive Foundation”, Second edition, Addison Wesley Longman, 2001.
4. Timothy J.Ross, “Fuzzy Logic with Engineering Application “, McGraw Hill, 1977.
5. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y., 1989.
6. Rajasekaran S. and. Pai G.A.V, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003

ELECTIVES FOR EIGHTH SEMESTER

U14ITTE61 DISTRIBUTED SYSTEMS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Explain the architecture of distributed systems
CO2: Demonstrate the organization of client, server & implementation of naming system
CO3: Explain various process synchronization methods & ways to achieve its consistency
CO4: Explain the architecture, communication, synchronization; fault tolerance & security in object based distributed system
CO5: Develop distributed application for real life problem using tools

Pre-requisite :

1. U14ITT504-Computer Networks

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											M
CO2	M	W										
CO3	M	W										
CO4	M	W										
CO5	M	W			S				M	W		M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INTRODUCTION 9 Hours

Introduction to Distributed systems-examples of distributed systems- resource sharing and the web- challenges-architectural models- fundamental models - Introduction to inter-process communications-external data representation and marshalling- client server communication-group communication.

DISTRIBUTED OBJECTS AND FILE SYSTEM 9 Hours

Introduction - Communication between distributed objects - Remote procedure call - Events and notifications - Java RMI case Study - Introduction to Distributed File System - File service architecture - Sun network file system - Introduction to Name Services- Name services and DNS - Directory and directory services

DISTRIBUTED OPERATING SYSTEM SUPPORT 9 Hours

The operating system layer – Protection - Process and threads - Communication and invocation - Operating system architecture - Introduction to time and global states - Clocks, Events and Process states - Synchronizing physical clocks - Logical time and logical clocks - Distributed debugging – Distributed mutual exclusion.

TRANSACTION AND CONCURRENCY CONTROL – DISTRIBUTED TRANSACTIONS 9 Hours

Transactions – Nested transaction – Locks - Optimistic concurrency control - Timestamp ordering - Comparison of methods for concurrency control - Introduction to distributed transactions - Flat and nested distributed transactions - Concurrency control in distributed transactions - Distributed deadlocks - Transaction recovery

SECURITY AND REPLICATION 9 Hours

Overview of security techniques - Cryptographic algorithms – Digital signatures - Cryptography pragmatics – Replication - Introduction to Distributed Multimedia systems.

Theory : 45 Hrs **Total Hours:45**

REFERENCES

1. George Coulouris, Jean Dollimore, Tim Kindberg, , "Distributed Systems: Concepts and Design", 5th Edition, Pearson Education, 2011.
2. A. S. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2006.
3.MukeshSinghal and N. G. Shivaratri, “Advanced Concepts in Operating Systems”, 1st Edition ,McGraw-Hill, 2011.

U14ITTE62 INFORMATION SECURITY

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Describe threats to information security and security SDLC.
CO2: Identify the security threats and attacks.
CO3: Analyze the mechanism to assess and control risk.
CO4: Describe the types of security policies and standards.
CO5: Identify security issues related to personnel decisions, and qualifications of security personnel.

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M	M				S						M
CO3	M											M
CO4	M					M						
CO5	M	S										M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INTRODUCTION 9 Hours

History of Information Security - Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Securing the Components - Balancing Security and Access - The SDLC - The Security SDLC.

SECURITY INVESTIGATION 9 Hours

Need for Security - Business Needs - Threats – Attacks – Legal - Ethical and Professional Issues.

SECURITY ANALYSIS 9 Hours

Risk Management : Identifying and Assessing Risk - Assessing and Controlling Risk.

LOGICAL DESIGN 9 Hours

Blueprint for Security - Information Security Policy - Standards and Practices - ISO 17799/BS 7799 – NIST Models - VISA International Security Model - Design of Security Architecture - Planning for Continuity.

PHYSICAL DESIGN 9 Hours

Security Technology – IDS - Scanning and Analysis Tools –Access Control Devices - Physical Security - Security and Personnel.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Fourth Edition, Thomson Publishing, India Edition, 2011.
2. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
3. Stuart Mc Clure, et al., "Hacking Exposed", Tata McGraw- Hill, Sixth edition, 2009.
4. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.

U14ITTE63 MANAGEMENT INFORMATION SYSTEM

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Relate the value of information systems to various firms.

CO2: Describe key information technologies used in today's businesses, such as databases and business intelligence tools.

CO3: Analyze issues related to information systems acquisition, development, operations, and management.

CO4: Identify the ethical, social, and security issues of information systems.

CO5: Apply the skills and techniques necessary to use a computer for information management in a business environment.

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
CO2	M											
CO3	M	M										
CO4	M	M			S							
CO5	M	M										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar 5.Case study	1. Course Exit Survey

9 Hours

Overview of IS - Business Perspective - Contemporary Approaches - New Role of IS in Organizations - E Commerce - E Business - New Opportunities - Types of Systems – Functional Perspective - Enterprise Applications – ES, SCM, CRM, KM.

9 Hours

Organizations and IS - Changing Role of IS - Decision Making - Business Strategy – E Business and E Commerce.

9 Hours

Computer Hardware - Computer Categories - Software- Management. Data in Files - Database Environment - Database Management - Trends - New IT Infrastructure – Internet – WWW – Support Technology – Management Issues and Decisions.

9 Hours

KM in Organizations – KWS – AI - Intelligent Techniques - Decision Support Systems – GDSS - Executive Support Systems - Organizational Change – BPR - Systems Development – Approaches - Application Development

9 Hours

System Vulnerability and Abuse - Control Environment - System Quality. International IS - Growth – Organizing - Managing - Issues and Opportunities?

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Kenneth C. Laudon and Jane Price Laudon, "Management Information Systems - Managing The Digital Firm", Thirteenth Edition, Pearson Education Asia, 2013.
2. Gordon B.Davis, "Management Information System: Conceptual Foundations, Structure And Development", McGraw Hill, 1974.
3. Steven Alter, "Information System – A Management Perspective" – Addison Wesley, 1999.
4. James O' Brein, "Management Information Systems", Tata McGraw Hill, New Delhi, 1999.
5. Ralph M.Stair and George W.Reynolds, "Principles Of Information Systems – A Managerial Approach", Thomson Asia Pvt. Ltd., 2001.

U14ITTE71 OPEN SOURCE SOFTWARE

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Summarize the advantages of open source software over proprietary software.

CO2: Apply object-oriented programming concepts to develop dynamic interactive Python applications.

CO3: Design PHP web pages and to develop a database-driven PHP application.

CO4: Demonstrate the features of non relational database over relational database

CO5: Develop simple applications in PERL.

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
CO2	M	M			M							
CO3	M	M			M							
CO4	M	M			M							
CO5	M	M			M							

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4.Seminar	1. Course Exit Survey

INTRODUCTION **9+3 Hours**

Introduction to Open Sources – Need of Open Sources – Advantages of Open Sources– Application of Open Sources - Open Source Operating Systems: LINUX: Introduction – General Overview – Kernel architecture-Kernel Mode and User Mode – Process Management – Scheduling –Signal handling

PHP **9+3 Hours**

PHP: Introduction – Programming in Web Environment – Variables – Constants –Data; Types – Operators – Statements – Functions – Arrays – OOP – String Manipulation and Regular Expression – File Handling and Data Storage – PHP and SQL Database – PHP and LDAP – PHP Connectivity – Sending and Receiving E-mails

PYTHON **9+3 Hours**

Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP

MongoDB **9+3 Hours**

Basics of JSON-NoSQL-Relational vs Non Relational Database-Mongo DB-Creating, Updating and deleting documents-Querying: Fundamentals-arrays-Embedded documents-Indexing: Basics

PERL **9+3 Hours**

PERL Backgrounder – PERL Overview –Variables and Data – Statements and Control Structures – Subroutines - Packages and Modules - Working with Files – Data Manipulation-Perl Process Management.

Theory: 45 Hrs **Tutorial: 15 Hrs** **Total Hours:60**

REFERENCES

1. Robert Love, “Linux Kernel Development”, Third edition, Pearson Publications, 2011
2. Kristina Chodorow,"MongoDB: The Definitive Guide", 2nd Edition,O'Reilly Media,May 2013
3. Rasmus Lerdorf ,Levin Tatroe& Peter McIntyre, “Programming PHP”, O’Reilly, 2006
4. Wesley J. Chun, “Core Phython Programming”, Prentice Hall, 2006
5. Martin C. Brown, “Perl: The Complete Reference”, Second edition, Tata McGraw-Hill, Indian Reprint, 2009.
6. http://www.tutorialspoint.com/mongodb/
7. http://www.w3resource.com/mongodb/introduction-mongodb.php

U14ITTE72 SERVICE ORIENTED ARCHITECTURE

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Demonstrate an understanding of architectural principles, architecture evolution processes, development methods with SOA, strengths and difficulties of service-oriented system development

CO2: Organize the services to perform the service composition

CO3: Model and design a service-oriented system using architectural principles, development methods with SOA and service-related technologies systematically and effectively

CO4: Apply development methods with SOA and service-related technologies in service-oriented system development and demonstrate ability to work as a member of a software development project team

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	W										
CO2	S	S										
CO3	S	S			S							
CO4	M	M			M							

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar 5. Case study	1. Course Exit Survey

SOA AND WEB SERVICES FUNDAMENTALS **9+3 Hours**

The Evolution of SOA –Characteristics of SOA – Introducing SOA

WEB SERVICES, PRIMITIVE SOA AND CONTEMPORARY SOA **9+3 Hours**

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination –Atomic Transactions – Business activities – Orchestration – Choreography - Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer

BUILDING SOA **9+3 Hours**

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Task centric business service design

SOA PLATFORMS **9+3 Hours**

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE)

FUNDAMENTAL WS EXTENSIONS **9+3 Hours**

WS-BPEL basics – WS-Coordination overview - WS-Policy- WS-Security

Theory: 45 Hrs Tutorial: 15 Hrs **Total Hours:60**

REFERENCES

1. Thomas Erl**, "**Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005.
2. Thomas Erl, "SOA Principles of Service Design "(The Prentice Hall Service-Oriented Computing Series from Thomas Erl), 2005.
3. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education,2005.
4. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.
5. Dan Woods and Thomas Mattern, "Enterprise SOA Designing IT for Business Innovation" O'REILLY, First Edition, 2006.

U14ITTE73 SEMANTIC WEB

L	T	P	C
3	1	0	4

Course Outcomes :

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

CO1: Explain the Semantic web layers and it's functionalities

CO2: Explain the syntax and semantics of OWL, and construct an ontology for a particular domain to enhance an application

CO3: Outline various languages used for Semantic Web and Ontologies

CO4: Build ontologies in OWL using the de facto standard editor, Protege, justify their design

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M	M			M							
CO3	M											
CO4	M	M			M				M			

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Case study	

INTRODUCTION **9+3 Hours**

Components – Types – Ontological Commitments – Ontological Categories – Philosophical Background - Knowledge Representation Ontologies – Top Level Ontologies – Linguistic Ontologies – Domain Ontologies – Semantic Web – Need – Foundation – Layers – Architecture.

LANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES **10+3 Hours**

Web Documents in XML – RDF - Schema – Web Resource Description using RDF- RDF Properties – Topic Maps and RDF – Overview – Syntax Structure – Semantics – Pragmatics - Traditional Ontology Languages – LOOM- OKBC – OCML - Flogic Ontology Markup Languages – SHOE – OIL - DAML + OIL- OWL.

ONTOLOGY LEARNING FOR SEMANTIC WEB **10+3 Hours**

Taxonomy for Ontology Learning – Layered Approach – Phases of Ontology Learning – Importing and Processing Ontologies and Documents – Ontology Learning Algorithms - Evaluation

ONTOLOGY MANAGEMENT AND TOOLS **9+3 Hours**

Overview – need for management – development process – target ontology – ontology mapping – skills management system – ontological class – constraints – issues. Evolution – Development of Tools and Tool Suites – Ontology Merge Tools – Ontology based Annotation Tools.

APPLICATIONS **7+3 Hours**

Web Services – Semantic Web Services - Case Study for specific domain – Security issues –currenttrends.

Theory: 45 Hrs Tutorial: 15 Hrs **Total Hours:60**

REFERENCES

1. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez, "Ontological Engineering: with examples from the areas of Knowledge Management, e-Commerce and the Semantic Web" Springer, 2004
2. Grigoris Antoniou, Frank van Harmelen, "A Semantic Web Primer (Cooperative Information Systems)", The MIT Press, 2004
3. Alexander Maedche, "Ontology Learning for the Semantic Web", Springer; 1 edition, 2002 John Davies, Dieter Fensel, Frank Van Harmelen, "Towards the Semantic Web: Ontology – Driven Knowledge Management", John Wiley & Sons Ltd., 2003.
4. Dieter Fensel (Editor), Wolfgang Wahlster, Henry Lieberman, James Hendler, "Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential", The MIT Press, 2002
5. Michael C. Daconta, Leo J. Obrst, Kevin T. Smith, "The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management", Wiley, 2003
6. Steffen Staab (Editor), Rudi Studer, "Handbook on Ontologies (International Handbooks on Information Systems)", Springer 1st edition, 2004

U14ITTE81 DECISION SUPPORT SYSTEMS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Explain about Business Intelligence Models

CO2: Describe the development of Decision Support System

CO3: Explain about Artificial Neural Networks and Knowledge Management

CO4: Illustrate the Inference Techniques, Expert Systems and Management Support Systems

Pre-requisite :

1. U14CST601-Artificial Intelligence

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M											
CO3	M											
CO4	M	W								M		M

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

DECISION SUPPORT AND BUSINESS INTELLIGENCE **9 Hours**

Decision Support Systems and Business Intelligence – Decision Making, Systems, Modeling and Support.

COMPUTERIZED DECISION SUPPORT **9 Hours**

Decision Support Systems Concepts, Methodologies and Technologies – Modeling and Analysis

BUSINESS INTELLIGENCE **9 Hours**

Data Mining for Business Intelligence-Artificial Neural Networks for Data Mining –Business Performance Management

COLLABORATION, COMMUNICATION, GROUP SUPPORT SYSTEMS AND KNOWLEDGE MANAGEMENT **9 Hours**

Collaborative Computer-Supported Technologies and Group Support Systems - Knowledge Management.

INTELLIGENT SYSTEMS **9 Hours**

Artificial Intelligence and Expert Systems-Management Support Systems: Emerging Trends and Impacts.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Efraim Turban, Ramesh Sharda, Dursun Delen ,"Decision Support and Business Intelligence Systems", Ninth Edition, Pearson Education, 2011.
2. V.S.Janakiraman and K.Sarukesi, "Decision Support Systems", Prentice Hall of India, 2004.
3. Efrem G Mallach, "Decision Support Systems and Data Warehouse Systems", Mc Graw Hill, 2000.
4. George M Marakas, "Decision Support Systems", II edition, - Pearson/Prentice Hall, 2002.

U14ITTE82 SOFTWARE PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Understand software project planning and management.

CO2: Select appropriate project approach for problem at hand.

CO3: Categorize risk and analyze resources.

CO4: Evaluate cost and contract management.

CO5: Measure and enhance Software Quality

Pre-requisite:

1. U14ITT502-Software Engineering

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M										W	
CO2	M	S			M					S	M	
CO3	M	W										
CO4	M	W										
CO5	M	W										

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar 5.Project	1. Course Exit Survey

INTRODUCTION **5 Hours**

Software Project Management - An Overview of Project Planning - Programme Management and Project Evaluation.

COST ESTIMATION 6 Hours

Selection of an Appropriate Project Approach – Software Effort Estimation - Activity Planning

RISK MANAGEMENT AND RESOURCE ALLOCATION 14 Hours

Risk Management: Risk – Categories of Risk – A Framework for Dealing with Risk – Risk Identification – Risk Assessment – Risk Planning – Risk Management – Evaluating Risks to the Schedule –Monte Carlo Simulation – Critical Chain Concepts.

Resource Allocation: The Nature of Resources – Identifying Resource Requirements – Scheduling Resources – Creating Critical Paths - Publishing the Resource Schedule – Cost Schedules – The Scheduling Sequence.

MONITORING, MANAGING AND CONTROL 12Hours

Monitoring and Control: Creating the Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value Analysis – Prioritizing Monitoring – Change Control

Managing Contracts: The Supply Process – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance

MANAGING PEOPLE AND ORGANIZING TEAMS 9 Hours

Managing People and Organizing Teams - Software Quality– Practical Software Quality Measures – Product versus Process Quality Management – External Standards – Techniques to Help Enhance Software Quality – Quality Plans.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. Bob Hughes, Mike Cotterell, “Software Project Management”, Fifth Edition, Tata McGraw Hill, 2010.
2. Walker Royce, “Software Project Management– A Unified Framework”, Pearson Education, 2004.
3. Humphrey and Watts, “Managing the software process” , Addison Wesley, 1989.

U14ITTE83 BUSINESS INTELLIGENCE AND ITS APPLICATIONS

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: Differentiate between Transaction Processing and Analytical applications and describe the need for Business Intelligence

CO2: Demonstrate understanding of technology and processes associated with Business Intelligence framework

CO3: Demonstrate understanding of Data Warehouse implementation methodology and project life cycle

CO4: Identify the metrics, indicators and make recommendations to achieve the business goal for a given scenario

CO5: Design an enterprise dashboard that depicts the key performance indicators which helps in decision making

Pre-requisite :

1. U14ITT402 – Data Base Management Systems
2. U14ITT602 – Data Warehousing and Data Mining

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M	W										
CO3	M	W										
CO4	M	W				W						
CO5	M	M			W							

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. End Semester Exam 3. Assignment 4. Seminar	1. Course Exit Survey

INTRODUCTION TO BUSINESS INTELLIGENCE **6 Hours**

Introduction to OLTP and OLAP, BI Definitions & Concepts, Business Applications of BI, BI Framework, Role of Data Warehousing in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities

BASICS OF DATA INTEGRATION (EXTRACTION TRANSFORMATION LOADING) **15 Hours**

Concepts of data integration need and advantages of using data integration, introduction to common data integration approaches, introduction to ETL using SSIS, Introduction to data quality, data profiling concepts and applications

INTRODUCTION TO MULTI-DIMENSIONAL DATA MODELING **9 Hours**

Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using SSAS

BASICS OF ENTERPRISE REPORTING **15 Hours**

Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, introduction to SSRS Architecture, enterprise reporting using SSRS.

Theory: 45 Hrs **Total Hours:45**

REFERENCES

1. David Loshin, Business Intelligence ,Second Edition, Morgan Kaufmann Series,2012
2. Mike Bierre, Business Intelligence for the Enterprise, IBM Press,2003
3. Larissa T. Moss, Shaku Atre, Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications,Addison-Wesley,2003
4. Cindi Howson, Successful Business Intelligence: Secrets to Making BI a Killer App, McGraw-Hill,2008
5. Brain, Larson, Delivering business intelligence with Microsoft SQL server 2008 , McGraw-Hill,2009

ONE CREDIT COURSES

U14IT*IN*01 INNOVATION AND ENTREPRENEURSHIP

Course Outcomes :

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

CO1: Develop skills for innovative thinking.

CO2: Analyze the plans for Entrepreneurship.

Pre-requisite: Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M										
CO2	M	M										

Course Assessment methods:

Direct	Indirect
Seminar / Assignment	Course Exit Survey

1. Introduction to Entrepreneurship & Business Plans
2. Understanding Failures in Entrepreneurship
3. Thinking Innovatively for Engineers
4. Preparing your Business Plan effectively
5. Branding & Company Description
6. Understanding your Target Market, industry analysis, trends and future markets
7. Risk Management, Sales Strategy, Marketing & Scenario Plans
8. Elevator Pitch
9. Operations, Technology, Management & Organization
10. Intellectual Property
11. Venture Capital Financing
12. Community Involvement, Social Responsibility, Milestones and Exit Plans
13. The Lean Startup
14. Types of Organizations to Consider while making a business plan

Total Hours: 15

U14IT*IN*02 ERP AND BUSINESS APPLICATIONS

Course Outcomes :
After successful completion of this course, the students should be able to

CO1: Explain the ERP usage in Business Applications
CO2: Demonstrate the use of ERP Implementation Methodology in SAP
CO3: Outline the importance of SAP software

Pre-requisite: Nil

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	W										
CO2	M	W										
CO3	M	W										

Course Assessment methods:

Direct	Indirect
Seminar / Assignment	1. Course Exit Survey

FUNDAMENTALS **4 Hours**

An Overview – ERP, Enterprise, Benefits of ERP, Business Process Modeling, Business Process Reengineering (BPR), Supply Chain Management

THE BUSINESS MODULES AND ERP MARKET PLACE **4 Hours**

Business modules in an ERP Package, Materials Management ,Finance, Manufacturing, Plant Maintenance, , Quality Management, Sales and Distribution, Human Resources
ERP Market Place, SAP AG, PeopleSoft, Baan, JD Edwards, Oracle

ERP IMPLEMENTATION **4 Hours**

ERP Implementation Lifecycle, Implementation Methodology, Organizing the Implementation, Project Management and Monitoring

SAP R/3 AND BUSINESS APPLICATIONS **3 Hours**

SAP R/3 Basis Technology, Business Frame work Architecture, ASAP Methodology, SAP Core Functional Modules, New Dimension Products

Theory: 15 Hrs **Total Hours:15**

REFERENCES

1. Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning Concepts and Practice", Prentice Hall of India, 2003
2. Alexis Leon, "ERP Demystified", Tata McGraw Hill, 2000
3. http://www.1172006.com/store/books/SAP_R3_Handbook_-_Third_Edition.pdf
4. http://www.saptechies.org/sap-pdf-books-download/basis/Sap-r3-Handbook.pdf