COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY

T. Y. B. Tech. (Computer Engineering)
Effective from A. Y. 2013-14

INDEX

List of Abbreviations

Sr. No.	Abbreviation	Stands for:
1	DEC	Departmental Elective Course
2	PSC	Professional Science Course
3	PCC	Program Core Course
4	LC	Laboratory Course
5	HSSC	Humanities and Social Science Course
6	MLC	Mandatory Learning Course
8	LLC	Liberal Learning Course
9	BSC	Basic Science Course

Program Educational Objectives (PEOs):

1. To create graduates with sound knowledge of fundamentals of computer science and technology, who can contribute towards advancing science and technology.
2. To create graduates with sufficient capabilities in computer science and scientific computing who can become researchers and developers to satisfy the needs of the core computer technology industry.
3. To develop among students ability to formulate, analyse and solve real life problems faced in software industry.
4. To provide opportunity to students to learn the latest trends in computer technology and make them ready for life-long learning process.
5. To make the students aware of professional ethics of the Software Industry, and prepare them with basic soft skills essential for working in community and professional teams.
6. To prepare the students for graduate studies through competitive examinations, enabling them to reach higher echelons of excellence.

Program Outcomes (POs):

a. Graduates will demonstrate basic knowledge in fundamentals of programming, algorithms and programming technologies and fundamentals of Computer Science.

b. Graduates will demonstrate knowledge of fundamentals of hardware technology relevant to understanding Computer Science basics.

c. Graduates will have knowledge of the best practices in software development in industry.

d. Graduates will demonstrate the ability to design creative solutions to real life problems faced by the industry.

e. Graduates will demonstrate capability to work in teams and in professional work environments

f. Graduates will be able to communicate technical topics in written and verbal forms.

g. Graduates will demonstrate an understanding of the problems most relevant in time to Computer Engineering.

h. Graduates will demonstrate their ability to use the state of the art technologies and tools including Free and Open Source Software (FOSS) tools in developing software.

i. Graduates will demonstrate good performance at the competitive examinations like GATE, GRE, CAT for higher education.

j. Graduates will demonstrate their qualities of learning and demonstrating latest technology

k. Graduates will have developed the capability for self-learning.

CURRICULUM STRUCTURE OF T. Y.-B.TECH (Computer Engg.)

Effective from A. Y. 2013-2014

I-Semester:

Sr. No	Course Type / code	Subject Title	Contact hours			Credits
			L	T	P	
01	DE- 09001	*Department Elective	3	-	-	3
02	PCC/CT- 09002	Design and Analysis of Algorithms	3	-	-	3
03	PCC/CT- 09003	Database Management Systems	3	-	-	3
04	PCC/CT -09004	System Programming	3	-	-	3
05	PCC/CT -09005	Computer Networks	3	-	-	3
06	LC/CT -09006	Design and Analysis of Algorithms Lab	-	-	2	1
07	LC/CT -09007	Database Management Systems Lab	-	-	3	2
08	LC/CT -09008	System Programming Lab	-	-	2	1
09	LC/CT -09009	Computer Networks Lab	-	-	3	2
10	MLC/ML-09001	Constitution of India	2	-	-	2
11	HSSC/AS-09002	Humanities course	2	-	-	2
		Total	**19**	**0**	**10**	**25**

*Department Elective: Computer Organization

II-Semester:

Sr. No	Course Type / code	Subject Title	Contact hours			Credits
			L	T	P	
01	OEC/SEC	*Open Elective/Science Elective Course Refer to Annexure I	3	-	-	3
02	PCC/CT-090010	Operating Systems	3	-	-	3
03	PCC/CT-090011	Computer Algorithms in Signal Processing	3	-	-	3
04	PCC/CT-090012	Software Engineering	3	-	-	3
05	DE	**Department Elective	3	-	-	3
06	LC/CT-090013	Operating Systems Lab	-	-	3	2
07	LC/CT-090014	Computer Algorithms in Signal Processing Lab	-	-	3	2
08	LC/CT-090015	Software Engineering Lab	-	-	3	2
09	DE lab	**Department Elective Lab– 1	-	-	3	2
10	LLC/LL-09001	Refer to Annexure II	-	-	3	1
		Total	**15**	**0**	**15**	**24**

**Department Elective – 1	Code	**Department Elective Lab– 1	Code
AM: Advanced Microprocessors	DE-09010	Advanced Microprocessors Lab	DE-09014
OOM: Object Oriented Modeling	DE-09011	Object Oriented Modeling Lab	DE-09015
CG: Computer Graphics	DE-09012	Computer Graphics Lab	DE-09016
DM: Data Mining	DE-09013	Data Mining Lab	DE-09017
CPEP: Concurrent Programming in Embedded Systems		Concurrent Programming in Embedded Systems Lab	

DE - 09001 COMPUTER ORGANIZATION

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(4 Hrs)**

CPU Architecture, instruction format, control signals in CPU, micro program control unit and hard wired control unit, ALU & sequencer, look ahead carry generator.

Unit 2 **(7 Hrs)**

Arithmetic, Integer Arithmetic, multiplication, Booth's Algorithm, Floating point number representation, floating point arithmetic, division algorithm.

Unit 3 **(7 Hrs)**

Memory:
Dynamic RAM organization, CACHE memory & it's mapping, cache organization in multicore Processor, virtual memory, secondary storage, IDE, SCSI, RAID, CD, DVD.

Unit 4 **(8 Hrs)**

Interrupt structure of 8086, closely coupled and loosely coupled multiprocessor systems, bus arbitration, co processor, key board & video RAM, character generator ROM, Display Card,

Unit 5 **(6 Hrs)**

Instruction Pipelining, Introduction to the basic features & architecture of RISC & CISC processors, super scalar processor.

Unit 6 **(4 Hrs)**

OS Support :
Component of OS, example of MS-DOS, IT'S LOADING, DOS, and BIOS interrupts.

Text Books:

- William Stallings, Computer Organization and Architecture, 9/EproductFormatCode=C02 productCategory=2 statusCode=5 isBuyable=true subType= path/ProductBean/courseSmarttrue ISBN-10: 013293633X ISBN-13: 9780132936330978013293633097801329363309780132936460©2013 Prentice Hall
- Carl Hamacher, Zvonko Vraesic and Safwat Zaky, Computer Organisation, ISBN 0-07-232086-9 MGH 5th edition
- Douglas V. Hall, Microprocessors and interfacing, ISBN 0-07-025526-1,Tata McGraw-Hill

Reference Books:

- Liu & Gibson, Microcomputer Systems, PHI, ISBN: 978-81-203-0409-3
- D. Paterson, J. Hennesy, "Computer Organization and Design: The Hardware Software Interface", 2nd Edition, Morgan Kauffman, 2000 ISBN 981 – 4033 – 588.

Outcomes:

This course aims at

- Introducing fundamental principles of Computer Organization.
- Introducing the concepts in sequencing of control signals in instruction execution
- Studying the memory hierarchy in Computer Organization
- Studying concept of multiprocessor system
- Studying the concept of RISC
- This course will expose students to trends in DRAM technology, cache memory, paging in virtual memory and secondary storage

CT- 09002 : DESIGN AND ANALYSIS OF ALGORITHMS

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(6 Hrs)**

Introduction
Objectives of time and space analysis of algorithms; Order notations (O, Θ, Ω notations) with reference to the following algorithms: bubble sort, selection sort, insertion sort, Recurrences

Unit 2 **(6 Hrs)**

Data Structures
Arrays, Linked lists, Stacks and Queues. Binary search trees, Red-Black trees, Hash tables, Basics of graphs and their representations, Heaps and Heapsort

Unit 3 **(7 Hrs)**

Design Techniques
Divide and Conquer, Greedy Algorithms, Backtracking.

Unit 4 **(6 Hrs)**

Selected Algorithms from various areas
Graph Theory: Elementary Algorithms, DFS, BFS, Topological Sort, Minimum spanning trees (Kruskal and Prim's algorithms), Shortest Paths: Single Source shortest paths – Bellman-Ford algorithm, Dijkastra's algorithm, String Matching : The naïve string-matching algorithm, The

Robin-Karp algorithm, The Knuth-Morris-Pratt algorithm, Geometric algorithms.

Unit 5 **(5 Hrs)**

Introduction to Advanced Algorithm Design Techniques
Amortized Analysis: Aggregate analysis, The accounting method, The potential method, Probabilistic Analysis and Randomized Algorithms, The hiring problem, Indicator random variables, and Approximation Algorithms.

Unit 6 **(6 Hrs)**

Complexity Theory
Lower-bound arguments, NP-completeness**,** Introduction to NP-Complete.

Text Books:

- Thomas Cormen, Charles Leiserson, Ronald Rivest and Cliford Stein, "Introduction to Algorithms", PHI

Reference Books:

- E. Horowitz and S. Sahni. "Fundamentals of Computer Algorithms" , Galgotia, 1991
- V. Aho, J. E. Hopcroft, and J. D. Ullman, "The Design and Analysis of Computer Algorithms", Addison Wesley, 1974

Outcomes:

- Introduces the need of analyzing algorithms and basic techniques used in the analysis
- Makes students aware of standard design techniques
- Makes students aware of complexity theory
- Students equipped with all these topics will always be keen on writing efficient code, use standard techniques to solve problems from different domains and go for approximate solutions when the problems are computationally hard
- This course would give them an edge over other software professionals who know only technology.

CT - 09003 DATABASE MANAGEMENT SYSTEM

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation
Assignment/Quizzes – 40 marks
End Sem Exam - 60 mark

Unit 1 **(4 Hrs)**

Introduction:
Basic concepts, Advantages of a DBMS over file-processing systems, Data abstraction, Data Models and data independence, Components of DBMS and overall structure of DBMS, Data

Modeling, entity, attributes, relationships, constraints, keys E-R diagrams, Components of E-R Model.

Unit 2 **(4 Hrs)**

Relational Mode:
Relational Model: Basic concepts. Attributes and domains, concept of integrity and referential constraints, schema diagram. Relational Query Languages: Relational Algebra and Relational Calculus: Tuple relational and domain relational calculus.

Unit 3 **(4 Hrs)**

SQL:
Introduction to SQL, Characteristics and advantages of SQL, SQL Data Types and Literals, DDL, Tables: Creating, modifying, deleting, Views: Creating, dropping, Updation using Views, DML, SQL Operators, SQL DML queries, SELECT query and clauses, Set Operations, Predicates and Joins, Set membership, Tuple variables, set comparison, ordering of tuples, aggregate functions, nested queries, Database modification using SQL Insert, Update and Delete queries, Dynamic and Embedded SQL and concept of stored procedures, Query-by-example.

Unit 4 **(4 Hrs)**

Relational Database Design:
Notion of normalized relations, functional dependency, decomposition and properties of decomposition, Normalization using functional dependency, Multi-valued dependency and Join dependency.

Storage and File Systems:
Secondary Storage, RAID, File Organization, Indices, Static and Dynamic Hashing, B-trees and B+ Trees

Unit 5 **(4 Hrs)**

Query Management and Transaction Processing:
Measures of query cost, Selection operation, sorting and join operation, Transaction Concept, Components of transaction management, Concurrency and recovery system, Different concurrency control protocols such as timestamps and locking, validation, Multiple granularity, Deadlock handling, Different crash recovery methods such as log-based recovery, shadow-paging, Buffer management and Remote backup system.

Unit 6 **(6 Hrs)**

Object-Based Databases:
Nested Relations, Complex Types and Object Orientation, Querying with Complex Types, Creation of Complex Values and Objects, Comparison of Object-Oriented and Object-Relational Databases.

Database Architectures:
Database system Architecture: Centralized, Client Server, Parallel and Distributed Systems. Web enabled System.

Text Books:

- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, *"Database system concepts"*, 5th Edition, McGraw Hill International Edition.
- Raghu Ramkrishnan, Johannes Gehrke, *"Database Management Systems",* Second Edition, McGraw Hill International Editions.

Reference Books:

- Rob Coronel, "*Database systems : Design implementation and management*", 4th Edition, Thomson Learning Press.
- Ramez Elmasri and Shamkant B. Navathe, "Fundamental Database Systems", Third Edition, Pearson Education, 2003.

Outcomes:

This course is one of the fundamental courses in Computer Engineering.

- Introduces the fundamental concepts related to Database
- Introduces the query languages that are essential for querying databases.
- Introduces the various data models which describe the structure of the database.
- Introduces various types of File Systems.

CT - 09004 SYSTEM PROGRAMMING

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(6 Hrs)**

System Software and Assemblers
Definition, Components of system software, Evolution of system software, Language translators.Assemblers Structure of an assembler, Design of two pass assembler (8085 as ref), Single Pass assembler Table of incomplete instruction, back patching. Data structures used for design of One and Two pass assembler, Design and Implementation of two pass assembler, Error handling and Symbol Table management in assembler, Handling constants, literals, labels and Procedures, One pass assembler design and comparison with two pass assembler design, Cross assembler

Unit 2 **(6 Hrs)**

Macro Processor:
Basic Macro Processor Functions - Macro Definitions and Expansion, Macro Processor Algorithm and Data Structures, Macro Parameters – Positional, Keyword, Actual, Design and

implementation of simple macro processor, Nested Macro processor – Macro call within macro definition and macro definition within macro definition, Design and implementation of nested macro processor. General Macro processing concepts - Concatenation of Macro Parameters, Generation of Unique Labels, Conditional Macro Expansion, Macro Processor Design Options - Recursive Macro Expansion, implementation Examples - MASM Macro Processor

Unit 3 **(6 Hrs)**

Linkers and Loaders:
Basic Loader Functions - Design of an Absolute Loader, A Simple Bootstrap Loader, Machine-Dependent Loader Features - Relocation, Program Linking, Algorithm and Data Structures for a Linking Loader, Machine-Independent Loader Features - Automatic Library Search, Loader Options, Loader Design Options - Linkage Editor, Dynamic Linkage, Bootstrap Loaders, Implementation Examples - MS-DOS Linker

Unit 4 **(8 Hrs)**

Compiler:
Basic Compiler Function Compiler phases - Lexical Analysis – NFA and DFA, Syntax analysis - Grammars, Introduction to Top down v/s bottom up parsing, Semantic Analysis and SDT and dependency trees Intermediate code generation –three address code intermediate code forms, Compiler-Compilers. Compiler generation tools – LEX and YACC. Interpreters.

Unit 5 **(6 Hrs)**

Dynamic linking in windows:
Concept of clipboard, Dynamic data exchange, Dynamic link libraries. The need, conventional dynamic linking, libraries, the class library, dynamic linking, name mangling and DLLs. The use of call back functions, far function prologs, Different methods of specifying link, Dynamic linking with and without import.

Unit 6
System Tools:
Tools for program testing, Test editors – screen editor, Word processors, Debugger, tools for managing Flash memory & virtual machines.

Text Books

- D. M. Dhamdere : “Systems programming and operating system”, Tata McGraw Hill
- Abranhan Silberschatz, Peter B Galvin ; Operating System Concepts, Addition Wesley Publishing Company.

Reference Books

- Milenkovic ; Operating System Concepts and Design; McGraw Hills
- John j Donovan ;System Programming, Tata McGraw Hill

Outcomes:

This course is one of the most fundamental courses in Computer Engineering. This course (a)

- Introduces the system level programming concepts to the students
- Introduces the concept of designing language translators
- Introduces the importance of different tools during the translation of computer languages
- Make the students technically more familiar with Computer Systems

CT - 09005 COMPUTER NETWORKS

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(10 Hrs)**

Network Layer: Addressing
Network layer services, IPv4, Problems with IPv4, strategies to bridge the limitations (IP subnetting, CIDR, DHCP, NAT), Network design with CIDR, IPv6, Dual stack, Addressing, Options, Extension headers, Packet forwarding

Unit 2 **(8 Hrs)**

Network Layer: Protocols along with IPV4 and IPV6
Routing algorithms: Unicast protocols: RIP, OSPF, BGP and multicast routing protocols, ICMP, IGMP, DHCP, enhancements to all protocols in V6

Unit 3 **(6 Hrs)**

Transport Layer: Protocols
Services, Transport layer protocols, UDP, TCP: State Transition diagram, flow control, error control, TCP Timers

Unit 4 **(6 Hrs)**

Congestion control and Quality of Service
Queuing disciplines, TCP Congestion control, Congestion Avoidance Mechanisms, Quality of Service

Unit 5 **(6 Hrs)**

Advanced Internetworking
Multicast Routing, Multiprotocol Label Switching (MPLS), Mobile IP, VoIP

Unit 6 **(6 Hrs)**

Applications
Traditional Applications(WWW, HTTP, FTP, Email, Telnet, SSH, DNS), Peer-to-Peer Networks, Socket programming

Text Books

- B. A. Forouzan and Firouz Mosharraf, Computer Networks, A Top-Down Approach, Tata McGraw-Hill, 2012
- Pete Loshin, IPv6:Theory, Protocol, and Practice, Elsevier, 2004

References

- Larry L Peterson and B S Davie, Computer Networks: A Systems Approach, Elsevier,2012
- W. Richard Stevens, TCP/IP Illustrated, Vol. 1: The Protocols, 2nd Edition, Pearson, 2012
- B. A. Forouzan, "Data Communications and Networking", 4th Edition, Tata McGraw-Hill, 2010
- William Stallings, "Data and computer Communication", 7th Edition, Pearson Education, ISBN-81-297-0206-1
- A S Tanenbaum, "Computer Networks", 4th Edition, Pearson Education, ISBN 9788177581652
- Alberto Leon Garcia and Indra Widjaja, "Communication Networks, Fundamental Concepts and Key Architectures", 2nd Edition, Tata McGraw-Hill. 2004, ISBN-10: 007246352X
- J.F. Kurose and K. W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet" , 2nd Edition, Pearson, 2003, ISBN-13: 9780201976991

Outcomes:

This course gives brief about the concept of Computer Networking.

- Expose students to trends in analyze, design and document computer network specifications to meet client needs, use proper computer system and networking terminology, implement local area networks using both static and dynamic addressing techniques including sub netting, install and configure domain-based local area networks, use computer systems and networks in a responsible and ethical manner.

CT - 09006 DESIGN AND ANALYSIS OF ALGORITHM LAB

Teaching Scheme
Lectures : 2 hrs/week

Examination Scheme
Term Work – 50 marks
Practical –50 marks

1. Recursive and Iterative (Non Recursive) algorithm for specific problem and their complexity measures (Comparison Expected)
2. Verification of (worst and average) complexity measures of following sorting techniques
3. Selection sort, Bubble sort, Heap sort, Merge sort and Quick sort
4. Minimum Spanning tree as an example of Greedy approach [Prim's VS. kruskal]
5. Implementation of Single Source and All Pairs Shortest algorithms

6. Finding longest common subsequence of given two sequences using Dynamic Programming
7. 8-Queens Problem – Iterative and Recursive versions
8. Pattern Matching Algorithms: Naïve, Robin-Karp and KMP
9. Finding closest pair of points

Outcomes:

- Introduces the need of analyzing algorithms and basic techniques used in the analysis
- Makes students aware of standard design techniques
- Makes students aware of complexity theory
- Students equipped with all these topics will always be keen on writing efficient code, use standard techniques to solve problems from different domains and go for approximate solutions when the problems are computationally hard
- This course would give them an edge over other software professionals who know only technology.

CT - 09007 DATABASE MANAGEMENT SYSTEM LABORATORY

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Term Work – 50 marks
Practical –50 marks

List of Assignments:

Each student is assigned with a problem. The student is to develop a logical and physical database design for the problem**.**

1. The logical design performs the following tasks: Map the ER/EER diagrams to a relational schema. Be sure to underline all primary keys, include all necessary foreign keys and indicate referential integrity constraints.
2. Perform physical design based above logical design using Oracle/MSSQL on Windows platform and MySQL/PostgreSQL on Linux platform
3. Perform DML and DDL using all possible SQL commands and with the help any one host languages like C, C++, VB etc (i.e. embedded SQL)
4. Perform DML and DLL using PL/SQL and PL/pgSQL for the above problems.
5. Assignment based on object based database.
6. Assignment based on Indexing.
7. Design a mini project for any live problem as per SE constraints and implement using the techniques studied for above assignments.

Outcomes:

This course is one of the fundamental courses in Computer Engineering.

- Introduces the fundamental concepts related to Database
- Introduces the query languages that are essential for querying databases.
- Introduces the various data models which describes the structure of the database.
- Introduces various types of File Systems.

CT - 09008 SYSTEM PROGRAMMING LABORATORY

Teaching Scheme
Lectures : 2 hrs/week

Examination Scheme
Term Work – 50 marks
Oral –50 marks

List of Assignments:

1. Designing a simple assembler for hypothetical machine. Student should handle data segment, code segment, symbol table management as well as error handling.

2. Expand the above assignment to cover procedure.
3. Design a nested macro processor [Call to a macro processor inside macro definition].
4. Design a Bootstrap loader
5. Assignment on LEX and YACC
6. Design a DLL for a case study.
7. Design a Debugger.

Outcomes:

After completing this course the students should be able to

- Implement translators (assembler, macro pre-processor) in a high level programming language like C, C++
- Implement different programs in compiler generation tools like FLEX &
- Implement come intermediate code generation
- Implement code optimization techniques
- Students will be technically more familiar with Computer Systems.

CT - 09009 COMPUTER NETWORKS LABORATORY-I

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Term Work – 50 marks
Oral –50 marks

List of Assignments:

1. Client-server implementation using socket programming
2. Implementing Sliding window Protocol
3. Implementing Routing Protocol
4. Wireshark based experiments on Ethernet, HTTP, IP, ICMP, TCP, DNS
5. Creating network simulations using a Network Simulation tool
6. Case study of existing networks
7. Study of network components and resources

Outcomes:

This course gives brief about the concept of Computer Networking.

- Expose students to trends in analyze, design and document computer network specifications to meet client needs, use proper computer system and networking terminology, implement local area networks using both static and dynamic addressing techniques including sub netting, install and configure domain-based local area networks, use computer systems and networks in a responsible and ethical manner

ML -09001 Constitution Of India

Teaching Scheme
Lectures : 2 hrs/week

Examination Scheme
20 marks: Continuous evaluation- Asignments /Quiz
End - Sem Exam – 30 Marks

Unit 1 **(5 hrs)**

Preamble to the constitution of India. Fundamental rights under Part – III – details of Exercise of rights, Limitations & Important cases.

Unit 2 **(5 hrs)**

Relevance of Directive principles of State Policy under Part – IV. Fundamental duties & their significance.

Unit 3 **(4 hrs)**

Union Executive – President, Prime Minister, Parliament & the Supreme Court of India.

Unit 4 **(4 hrs)**

State executive – Governors, Chief Minister, State Legislator and High Courts.

Unit 5 **(4 hrs)**

Constitutional Provisions for Scheduled Castes & Tribes, Women & Children & Backward classes. Emergency Provisions.

Unit 6 **(4 hrs)**

Electoral process, Amendment procedure, 42^{nd}, 44^{th}, 74^{th}, 76^{th}, 86^{th} and 91^{st} Constitutional amendments.

Text Books:

1. Durga Das Basu: "Introduction to the Constitution of India" (Students Edn.) Prentice – Hall EEE, 19th/20th Edn., 2001.
2. "Engineering Ethics" by Charles E.Haries, Michael. S.Pritchard and Michael J.Robins Thompson Asia, 2003-08-05.

Reference Books:

1. "An Introduction to Constitution of India" by M.V.Pylee, Vikas Publishing, 2002.

Outcomes:

At the end of this course students will be aware about the Constitution:

- Appreciate the complexity of implementation of any law.
- Appreciate the roles and functions of various high officials.
- Know about Fundamental rights of citizens of India.
- Understand the Electoral process.
- Understand the provisions made for special groups and categories in the constitution

AS - 09002 Humanities course /Applied Psychology

Teaching Scheme
Lectures : 4 hrs/week
Practical : 2hrs/week

Examination Scheme
100 marks:
Assignments /Practical(T1 and T2)- 40 Marks,
End - Sem Exam – 60 Marks

Unit 1 **(4 hrs)**

Introduction to Psychology:
Definition, Nature and Aims, Counseling, Industrial and Social Psychology, Creativity and its application.
Mind Mapping and Problem Solving, Self Awareness, Johari window.

Unit 2 **(6 hrs)**

Personality:
Carl Jung's type theory, Bandura's Social learning, Big Five model Indian Perspective on Personality- Panchakosh Model, SWOT analysis, life planning, emotional intelligence.

(8 hrs)

Unit 3

Organizational Behaviour:
Behaviour at workplace (personality, attitude and perceptions), Motivation, Job satisfaction, Leadership and Group dynamics, Engineering Psychology (Ergonomics), Man-machine relation, Group dynamics, Transactional analysis

Unit 4 **(4 hrs)**

Stress Management:
Nature, types and causes of stress, General Adaptation Syndrome (GAS), Coping with Stress-Cognitive, Emotional, and Behavioural techniques, Type A and B theory.

Text Books

1. Morgan, C.T., King, R.A., Weisz, J.R., & Schopler, J. (2001). *Introduction to Psychology*. 7th Edition. New Delhi: Tata McGraw Hill
2. Schultz, D. & Schultz, S. E. (2002). *Psychology and Work Today*. 8th Edition. Pearson Education

Reference Book

1. Hilgard, E. R., Atkinson, R. C., Atkinson, R.L. (1975). *Introduction to Psychology*. 6th Edition. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.
2. Golman, Daniel. (1998). *Working with Emotional Intelligence*. Bloomsbury Publishing Plc.
3. Matthewman, L., Rose, A., & Hetherington, A. (2009). *Work Psychology*. Indian Edition. Oxford University Press.

Practical Work

Teaching Scheme
Practical: 2 hrs/week

Examination Scheme
Term-work: 50 Marks
Oral: 50 Marks

List of Experiments:

1: Self Awareness (20 Marks) **(4 hrs)**

Aims/Objectives for the Year- Newspaper Activity, SWOT analysis, Personal Effectiveness Scale, Johari Window.

2: **Level of Adjustment (10 Marks)** **(6 hrs)**

Adjustment Inventory By M.L. Saxena, Interpretation and Explanation

3: Stress and Personality (15 Mark) **(8 hrs)**

Student's Stress Scale by Dr. Manju Agrawal, Type A- B theory and test, Interpretation and Explanation

4:Emotional Quotient (5 Mark) **(4 hrs)**

Concept of EQ, EQ test by N.K.Chadha, Interpretation and Explanation

Outcomes:

After successful completion of the course students will be able-

1. To understand different aspects of their personality and to learn various life skills
2. To strengthen the skills required in industrial/workplace settings
3. To overcome stressful situations effectively with the help of psychological approach
4. To improve their social interactions.

OEC : OPEN ELECTIVE - INFORMATION SYSTEMS

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(5 Hrs)**

Introduction:
Define and understand the term information systems (IS). Technology, people, and organizational components of an information system, various types of information systems, nature of information systems in the success and failure of modern organizations, Understand and plan for the future of managing IS. Information systems for automation, organizational learning and strategic support, Formulate and present the business case for a system

Unit 2 **(6 Hrs)**

Database Management and Internet:
Importance of databases in modern organizations, Working of database management systems, Database design, Query Processing, how organizations are getting the most from their investment in database technologies. Role of telecommunications in organizations, Types of computer networks, Extranets, Intranets, Working of Internet, Basic Internet services, World Wide Web.

Unit 3 **(8 Hrs)**

Information Systems Development and Acquisition:
Process used by organizations to manage the development of information Systems. Major phases of the systems development life cycle: systems identification, selection, and planning; system requirement specifications; system design; system implementation; and system maintenance. Software prototyping, rapid application development, object-oriented analysis and design methods of systems development and their strengths and weaknesses, Factors in building a system in-house, along with situations, three system development options: external acquisition, outsourcing, and end-user development.

Unit 4 **(7 Hrs)**

Organizational Information Systems:
Characteristics of the operational, managerial, and executive levels of an organization, decision

support systems, expert systems, office automation systems, collaboration technologies

Unit 5 **(6 Hrs)**

Electronic Commerce:
Business to Customer e-commerce, Business to Business e-commerce, Customer to Customer e-commerce, Advantages and disadvantages of e-commerce, E-Commerce System Architecture, Payment schemes in e-commerce, Cash transactions in e-commerce, e-commerce applications.

Unit 6 **(6 Hrs)**

Information Systems Ethics, Computer Crime, and Security:
Impact of computer ethics on information systems, Issues associated with information privacy, accuracy, property and accessibility, computer crime and list several types of computer crime, computer virus, worm, Trojan horse, and logic or time bomb, various methods for providing computer security, IT Act 2000.

Text Books:

- "Information Systems Today, Managing in the Digital World" , Third Edition by Leonard M. Jessup; Joseph S. Valacich, Publisher: Prentice Hall
- "Introduction to Information Technology", V. Rajaraman, PHI

Reference Books:

- "Information Systems Management in Practice" Barbara C. McNurlin, Ralph H. Sprague, and Publisher: Pearson Education.

Outcome:

After studying this course it will develop ability to:

- Analyze functional and non-functional requirements to produce a system architecture that meets those requirements
- Understand and apply process and methodology in building the application
- Create design models using known design principles (e.g. layering) and from various view points (logical, physical etc.)
- Explain and justify all the design choices and tradeoffs done during the application's development

CT -09010 OPERATING SYSTEMS

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(4 Hrs)**

Introduction and Operating Systems structures:

Evolution of operating systems: Batch , timesharing, multiprogramming, multi tasking and distributed and real time. Operating system components, O.S. Services, System Calls, System Programs, System Structure, Virtual Machines, Special purpose operating systems, Open-source operating systems, Boot Procedure, Overview of the GNU/Linux system administration

Unit 2 **(6 Hrs)**

Processes and CPU Scheduling:
Process concept, interleaved I/O and CPU burst; Process states; Co-operating processes, Thread, Thread libraries, Multithreaded programming, Scheduling, Scheduling criterion, Scheduling algorithms, Multi processor scheduling, Real time scheduling, Interrupts and Interrupt handling

Unit 3 **(8 Hrs)**

Process Synchronization:
Critical section problem, Hardware support for mutual exclusion, Semaphores, Deadlock-principle, Deadlock detection, prevention and avoidance, Classical problems in concurrent programming: Producer-consumer, Reader-writer with and without bounded buffer. Design of locking primitives like spinlock, semaphore, read-write locks, recursive locks, etc

Unit 4 **(4 Hrs)**

Inter process Communication:
Pipes, Shared memory mechanism, Streams, Asynchronous communication, Signals. Operating system interfaces for application programming using openMP and MPI, Client Server Computing, Remote procedure calls

Unit 5 **(8 Hrs)**

Memory management:
O.S. and hardware interaction, Swapping, Continuous memory management, paging, Segmentation, Virtual Memory Management, Demand Paging, Copy-on-write, Page replacement algorithms, Allocation of frames, Thrashing, Kernel memory management, SVR4 architecture, Unified buffer cache

Unit 6 **(8 Hrs)**

Memory management:
O.S. and hardware interaction, Swapping, Continuous memory management, paging, Segmentation, Virtual Memory Management, Demand Paging, Copy-on-write, Page replacement algorithms, Allocation of frames, Thrashing, Kernel memory management, SVR4 architecture, Unified buffer cache

Unit 7 **(8 Hrs)**

Protection and Security:
Goals of protection, Domain of protection, Access matrix, Implementation of access matrix, Revocation of access rights, Security problems, Authentication, Program threats, System threats, Threat monitoring.

Textbooks

- Abranhan Silberschatz, Peter B Galvin, Greg Gagne; Operating System Concepts, Wiley India Students Edition, 8th Edition, ISBN: 978-81-265-2051-0
- Andrew S. Tanenbaum; Modern Operating Systems; Prentice Hall of India Publication; 3rd Edition. ISBN: 978-81-203-3904-0

References

- Milan Milenkovic; Operating Systems; Tata McGraw Hill; Second Edition. ISBN: 0-07-044700-4
- Maurice J. Bach; The Design of the Unix Opearating System; Prentice Hall of India; ISBN: 978-81-203-0516-8
- Uresh Vahalia; Unix Internals, The New Frontiers; Prentice Hall; ISBN: 0-13-101908-2

Outcomes:

- The Systems Programming course gives a brief account of various programs/components that comprise system software.
- This course goes into details of the architecture, concepts and algorithms related to a typical Operating System.
- This course will expose students to internals of Operating Systems which would make them fit for working on System Software related projects, performance-centric applications and thus make them serious programmers as compared to programmers who know only one or more programming.

CT -09011 COMPUTER ALGORITHMS IN SIGNAL PROCESSING

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(2 Hrs)**

Introduction :
Basic elements of digital signal processing (DSP) system, advantage of digital over analog signal processing, summary of DSP applications and introduction to DSP through these application.

Unit 2 **(8 Hrs)**

Signals And Systems :
Basic concept of signals as array of values, standard signals, linearity, shift invariance, stability and causality, Linear Shift Invariant(LSI) systems ,I/O mapping and difference equations, Linear convolution, properties of linear convolution, computation of linear convolution ,A\D conversion process as sampling, Quantisation, encoding, sampling theorem and anti aliasing filters.

Unit 3 **(8 Hrs)**

Analysis of Signals:
Fourier transform, Fourier transforms of standard signals ,properties of Fourier transform, inverse Fourier transform, computation of Fourier transform, Discrete Fourier transform (DFT) , DFT of standard signals , properties of DFT, computation of DFT, Fast Fourier Transform (FFT),Decimation In Time (DIT) and Decimation In Frequency(DIF), computation DIT/DIF FFTs ,Inverse DFT & computation of IDFT using the FFT algorithms

Unit 4 **(8 Hrs)**

Analysis of Signals:
Analysis of LSI Systems: Magnitude / phase transfer function using Fourier transform, computation of transfer function, Z transform, Z transform of standard signals, properties of Z transform ,inverse Z transform computation of Z transform , System function from Z transform and pole-zero plots, mputation of poles and zeros, Geometric constructs for transfer function viz. Region Of Convergence (ROC) using pole-zero plot and stability analysis.

Unit 5 **(6 Hrs)**

Digital Filters:
Implementation of general difference equation, cascade and parallel forms of computation, Finite Impulse Response(FIR) and Infinite Impulse Response(IIR),filters from difference equations , FIR filter design using inverse Fourier transform and Windowing Gibb's phenomenon, computation of window, IIR filter design using impulse invariance and bilinear transform, computation of system function for given design parameters.

Unit 6 **(4 Hrs)**

DSP Processors :
DSP micro-processor and their desirable features,ADSP-21XX and ADSP-210XX series of DSP micro-processor and their architectural features, implementing filters and FFTs on DSP micro-processor. Application of DSP: A brief overview of application of DSP in speech and image processing

Text Books :

- J.G. Proakis , D.G. Manolakis , " Digital Signal processing" , Pearson Education Sanjit k. Mitra
- Digital signal Processing a Computer based Approach" Tata McGraw- Hill

References :

- Emmanuel C. Ifeachor , "Digital Signal Processing : A practical Approach", Addison Wesley

Outcomes:

- Though the course is very mathematical, profound understanding of the subject it is essential.

- To bridge a gap between theoretical aspects and practical application, students are exposed to MATLAB based lab assignments.
- Emphasize throughout this course is on practical aspects of DSP.

CT -09012 SOFTWARE ENGINEERING

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(6 Hrs)**

Software Development process:
Is software an Engineering, Software Crisis and Myths, Software Process and development: Generic view of Process, Software life cycle and Models, Analysis and comparison of varies models, an agile view of process. Product vs Applications, Real Time Systems, System Engineering

Unit 2 **(6 Hrs)**

Requirement Engineering:
Requirements Engineering and Management. Initiating, Eliciting requirement, developing use-cases, building the Analysis Model, Negotiating and Validating requirement. Estimation techniques

Unit 3 **(6 Hrs)**

System Architecture and Design Overview:
Architecture 4+1 view, other architecture styles, Design process and design quality, Design concepts, Design Model. Pattern based software design, standardization. Diagramming in UML

Unit 4 **(6 Hrs)**

Testing:
Validation and Verification, Art of Testing, Testing Science and Arts. White Box Testing & Black Box Testing. Exploratory Testing

Unit 5 **(6 Hrs)**

Planning and Management of Project:
QA and QC, Tools and Techniques, CMMi, PSP-TSP, ISO, Metric, Project Reviews, Inspection, Configuration Management.

Unit 6 (6 Hrs)

Advanced and Contemporary topics:

Text Books

- Pressman R., "Software Engineering, A Practitioners Approach", 6th Edition, Tata McGraw Hill Publication, 2004, ISBN 007-124083-124083-7
- G. Booch, J. Rumbaugh, and I. Jacobson. The Unified Modeling Language User Guide. Addison Wesley, 1999

Reference Books
- Shari Pfleeger, “Software Engineering”, 2nd Edition. Pearson’s Education, 2001
- Ian Sommerville, “Software Engineering”, 6th Edition, Addison-Wesley, 2000
- Pankaj Jalote, “An Integrated Approach to Software Engineering”, Narosa Pub.House
- Fred Brooks, “Mythical Manmonths”, www.cs.drexel.edu/~yfcai/CS451/.

Papers:
- Fred Brook , “No Silver Bullets”, IEEE Software 1987.
- Eric Raymond, “Cathedral and Bazaar “, www.tuxedo.org/~esr/writings
- David Parnas, “On the Criteria To Be Used in Decomposing Systems into Modules” , Communications of the ACM, volume 15, #12, 1972
- Grady Booch Papers on architecture in IEEE Computer

Outcomes

This core course teaches the fundamental concepts in software development and introduces the best practices in software industry.

- Introduces the software development life cycle that professionals should know before entering in software industry
- makes aware of software ethics
- Prepares for the working in community and professional teams by way of understanding the basic elements and whole software development process

Departmental Elective -1

DE - 09010 ADVANCED MICROPROCESSORS

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(4 Hrs)**

Architecture: Architecture and Features of 8086, 80186, 80286, 80386, 80486 & Pentium processors.

Unit 2 **(6 Hrs)**

Memory Management:
Real & Protected modes, Protected mode programmer model, memory management through segmentation and paging, support registers and caching in memory management.

Unit 3 **(6 Hrs)**

Protection Mechanism:
Protection mechanism and privileges in protected mode, privileged instructions, protection mechanism in segmentation and paging procedures. Inter privilege level access mechanism gates. Multitasking support, task switching, task gates.

Unit 4 **(6 Hrs)**

Interrupt:
Interrupt, exception, faults, traps, interrupt handling in protected mode IDT, interrupt gate, trap gate, interrupt handling in protected mode, V86 mode. Extended features of V86, System Management Mode
Memory cache control: caching terminology, memory types, memory type range registers (MTRRs)
Page Attribute Table (PAT), assigning memory types to regions of physical memory based on linear
address mappings

Unit 5 **(6 Hrs)**

Memory Types & Peripheral Interface:
MMX technology, SIMD Execution Model, handling out-of-range conditions,
execution environment for the SSE, SSE2, Streaming SIMD Extensions 3(SSE3), Supplemental Streaming SIMD Extensions 3 (SSSE3). SSE4
Intel Hyper-Threading Technology, Multi-core technology, Intel 64 architecture features, Intel Virtualization Technology

Unit 6 **(8 Hrs)**

Peripheral Interface:
Introduction to I/O interface, I/O port address decoding, the ISA Bus, the Extended ISA(EISA), the Peripheral Component Interconnect (PCI) Bus, PCI Express, the Universal serial Bus (USB),

Text Books:
- Gibson, Microcomputer Systems, PHI, ISBN: 978-81-203-0409-3
- Barry B. Brey, The INTEL Microprocesoors, PHI, ISBN-81-203-1220-1

References:
- Tom Shanley, Protected Mode Software Architecture MINDSHARE, INC. Addison-Wesley Publishing Company, ISBN: 0-201-55447-X (.pdf)
- Intel® 64 and IA-32 Architectures Software Developer's Manual volumes 1, 2A, 2B, 3A, 3B (pdf)

Outcomes:

- This course gives the concept of multitasking capability of Pentium processor.
- This course exposes the students to memory management, task switching & protection facility in Pentium.
- This course also exposes the students to Micro-controller MCS-51 family architecture.

DE-09011 OBJECT ORIENTED MODELING

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(6 Hrs)**

Review of OO concepts. Object diagrams, Class diagrams, Classes and Relationships, Interfaces and ports, Templates, Active Objects, Advanced relationships generalization, inheritance, association, aggregation, dependencies

Unit 2 **(6 Hrs)**

Introduction to UML. UML History, UML New Features. Rational Unified Process emphasizing Inception, Elaboration, Construction, Transition Phases. 4+1 View architecture, Architectural approaches : Use case Centric, Architecture driven, Iterative approach. UML MetaModel. Extensibility mechanisms like stereotypes, tagged values, constraints and profiles. OCL. Overview of all diagrams in UML.

Unit 3 **(6 Hrs)**

Composite structure diagrams including composite structures, collaborations. Interaction diagrams. Interaction Overview diagrams including interactions, signals, exceptions, regions, partitions, Sequence diagrams, Communication diagrams.

Unit 4 **(6 Hrs)**

State Machine diagrams, States, encapsulation of states, transitions, submachine, state generalization. Timing diagrams, Activity diagrams, Activities, sub activities, signals, exceptions, partitions, regions.

Unit 5 **(6 Hrs)**

Support for modeling Architecture in UML. Package diagrams, Component diagrams, Deployment diagrams. Applications of UML in embedded systems, Web applications, commercial applications. All diagrams are to be assumed for UML 2.0 for each diagram the need, purpose, Concepts, Notation, Forward Engineering, Reverse Engineering & Application must be considered.

Unit 6 **(6 Hrs)**

Concepts of distributed operating system: COM and CORBA , Introduction to Object Oriented Database.

Text Books:

- Grady Booch, James Rumbaugh, Ivar Jacobson “Unified Modeling Language User Guide”, The (2nd Edition) (Addison-Wesley Object Technology Series)

- Rambaugh: Object Oriented Modelling and Design, PHI

Reference Books:

- Joseph Schmuller "SAMS Teach yourself UML in 24 Hours", 3rd edition.
- Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", 3rd Edition (Paperback) ,Addision Wesley
- Dan Pilone, Neil Pitman "UML 2.0 in a Nutshell", (In a Nutshell (O'Reilly)) Paperback)
- Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado "UML 2 Toolkit (Paperback)
- Jim Arlow, Ila Neustadt "UML 2 and the Unified Process : Practical Object-Oriented Analysis and Design" (2nd Edition) (Addison-Wesley Object Technology Series)
- Michael Jesse, James A. Schardt "UML 2.0 for dummies "
- Kendal Scott, Apress "Fast track UML 2.0 "

Outcomes:

- Develop the ability to design object oriented architecture for complex applications
- Develop the ability to use tools used in object oriented modeling.
- Master the art of using UML in object oriented modeling
- Understand the theoretical concepts of OOM

DE-09012 COMPUTER GRAPHICS

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(6 Hrs)**

Basic concepts:
Introduction to computer graphics, lines, line segments, vectors, pixels and frame buffers, vector generation, DDA and Bresenham's line and circle drawing algorithms, antialiasing, thick lines, character generation: Stroke Principle, Starburst Principle, Bit map method, display of frame buffer.

Graphics Primitives:
Primitive operations, display file structure, algorithms and display file interpreter, Text and line styles.

Unit 2 **(8 Hrs)**

Polygons:
Introduction, representation, entering Polygons, Polygon filling: Seed fill, Edge fill, scan conversion algorithm, filling with patterns.

2D Transformations:
Introduction, matrices, Scaling, Rotation, homogeneous coordinates, Translation, Co-ordinate transformation, rotation about an arbitrary point, inverse transforms, shear transforms and reflections.

Unit 3 **(8 Hrs)**

Segments:
Introduction, segment table, segment creation, closing, deletion, renaming. Image transformations, raster techniques

Windowing and clipping:
Introduction, viewing transforms, 2D clipping, Cohen-Sutherland algorithm, Midpoint subdivision algorithm, Cyrus Beck algorithm, Interior and Exterior clipping, Text Clipping, Polygon Clipping, Sutherland-Hodgman algorithm, Generalized clipping.

Unit 4 **(8 Hrs)**

3-D Transformations:
Introduction, 3-D geometry, primitives, transformations, Rotation about an arbitrary axis, Concept of parallel and perspective projections, Viewing parameters, 3D clipping, 3D viewing transformations.

Hidden Surfaces and Lines:
Introduction, Back-face removal algorithm, Z buffers, scan-line and the Painter's algorithm, Warnock's algorithm, hidden line methods, binary space partition.

Unit 5 **(6 Hrs)**

Light, Color and Shading:
Introduction, Diffuse illumination, point-source illumination, Specular reflection, shading algorithms, transparency, reflections, shadows, ray tracing, Colour models and tables.

Curves and fractals:
Introduction, Curve generation, Interpolation, interpolating algorithms, interpolating polygons, B-Splines and corners, Bezier curves, Fractals, fractal lines and surfaces.

Unit 6 **(6 Hrs)**

Animation:
Devices for producing animation, computer assisted animation, video formats, real time animation, frame-by-frame animation, method for controlling animation, animation software.

Texture Mapping:
Surface Texturing, Bump Mapping, Environment Mapping.

Text Books:

- D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002, ISBN 81 – 7808 – 794 – 4
- J. Foley, Van Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9
- V. K. Pachghare, "Computer Graphics", 2nd edition, Laxmi Publication, 2007, ISBN 81–318–0061 - X

Reference Books:

- D. Rogers, “Procedural Elements for Computer Graphics”, 2nd Edition, TATA Mc-Graw-Hill Publication, 2001, ISBN 0 – 07 – 047371 - 4
- F. Hill, “Computer Graphics: Using OpenGL”, 2nd Edition, Pearson Education, 2003 ISBN 81 – 297 – 0181 – 2
- S. Harrington, “Computer Graphics”, 2nd Edition, McGraw-Hill Publications, 1987 ISBN 0 – 07 – 100472 – 6
- Xiang, Plastock, “Computer Graphics”, 2nd Edition, TATA Mc-Graw-Hill Publication, 2002, ISBN-0-07-049958-6
- A. Sinha, A. Udai, “Computer Graphics”, 1st Edition, TATA Mc-Graw-Hill Publication, 2008, ISBN 10:0-07-0634378
- M. Pakhira, “Computer Graphics Multimedia and Animation”, 1st Edition, PHI, 2008, ISBN 978-81-203-3344-4

Outcomes:

This course teaches the fundamental concepts in multimedia that are useful in design on modern information systems based on multimedia

- Insight to multimedia file formats that are useful in design of multimedia applications
- state of the art tools and environments for design of multimedia applications using basic components viz. audio, image, and video with considering network protocols.

DE - 09013 DATA MINING

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 **(4 Hrs)**

Machine Learning and Data Mining-Data Flood, Data Mining and Knowledge Discovery, Data Mining Tasks
Data Preparation for Knowledge Discovery, Data understanding, Data cleaning, Data transformation, False "predictors" , Feature reduction, Randomization, Learning with unbalanced data.

Unit 2 **(6 Hrs)**

Knowledge Representation:
Decision tables, Decision trees, Decision rules, Rules involving relations, Instance-based representation ,Classification -Statistical Based Algorithms, Decision Trees Based Algorithms, Neural Networks Based Algorithms, Rules, Regression, Instance-based (Nearest neighbor), Case study

Unit 3 **(4 Hrs)**

Clustering:
Introduction, Clustering Methods, Ways of scaling clustering algorithms, Case study

Unit 4 **(6 Hrs)**

Associations:
Transactions, Frequent itemsets, Association rules, Applications.

Unit 5 **(8 Hrs)**

Data warehousing, OLAP and Data mining, web warehousing, Schema integration and data cleaning, Deduplication, Data marts: Multidimensional databases (OLAP)
Advanced topics

ETL, Integrating OLAP and mining, Online aggregation, Recap, future and visions.

Unit 6 **(8 Hrs)**

Advanced Topics:
Mining Multimedia Databases, Text Mining, Web Mining, Spatial Mining, Temporal Mining Applications and Trends in Data Mining- Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining, Social impacts of Data Mining, Trends in Data Mining

Reference Books :

- Jiawei Han, Micheline Kamber. Data Mining: Concepts and Techniques
- Heikki Mannila, Padhraic Smyth, David Hand. Principles of Data Mining
- Margaret H. Dunham. Data Mining: Introductory and Advanced Topics
- Soumen Chakrabarti Mining the Web- Discovering Knowledge from Hypertext Data
- Pang-Ning Tan, Michael Steinbach, Vipin Kumar. Introduction to Data Mining
- Ian H. Witten & Eibe Frank. Data Mining: Practical Machine learning Tools and Techniques
- T Hastie, R Tibshirani, J H Friedman. The Elements of Statistical Learning: Data Mining, Inference, and Prediction

Outcomes:

- Understand and apply the most current data mining techniques and applications, such as text mining, mining genomics data, and other current issues.
- Creatively deal with data related issues that need to be addressed for successful data mining to be carried out
- Systematically evaluate models/algorithms with respect to their accuracy
- Carry out a self directed piece of practical work that requires the application of data mining techniques in a creative manner
- Critique the results of a data mining exercise, Develop Hypotheses based on the analysis of the results obtained and test them
- Conceptualize a data mining solution to a practical problem

DE - CONCURRENT PROGRAMMING IN EMBEDDED SYSTEMS

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
100 marks: Continuous evaluation-
Assignment/Quizzes – 40 marks
End Sem Exam - 60 marks

Unit 1 (7 Hrs)

What is concurrency?
Concurrency as a modularisation paradigm
Challenges in concurrency;
Illustrative problems: Djikstra's "Deadly Embrace" problem, Dining philosophers problem
Solutions using semaphores
Developing programs using an Android development system under Eclipse
An overview of the Android Architecture
Checkpoints:
Describe different ways in which can a program be executed
How can these different ways programmed?
Which parts of a program can be executed in parallel?
Problems in concurrent programming:
Synchronisation, control deadlocks, resource deadlocks and starvation
Time and clocks in a distributed system, The global snapshot problem

Unit 2 (6 Hrs)

Formal description of concurrent programs: CCS/p calculus – mainly the syntax
Concurrent components and composition
Communication in a concurrent program
Different kinds of procedure calls
a. One to many: single caller – multiple callees
b. Many to one: multiple callers – single callee
c. Event driven calls – signals
d. Coroutines – execution multiplexing by explicit switching
e. Deep calls – exceptions
f. Network calls – RPC/RMI
Android approach to program expression: Java + XML, Multiple entry points

Unit 3 (7 Hrs)

Program execution models according to programmer intention:
Sequential execution, co-routines, concurrent, and distributed.
Context for program execution
More on CCS/p calculus
Describe some bigger problems already covered in programming
How to build a concurrent program:
Tool chains and system software support
Concurrent program execution:
The OS and its notion of a "process".

Unit 4 **(9 Hrs)**

Communicating processes:
Architectures – shared memory, messages
Procedure calls – messages implementated via shared memory (stack)
– The Android binder as the "call broker"
Client-server systems – message passing through "mail boxes" & RPC/RMI
Client-server "Service discovery" – a message passing through Open binder

Unit 5 **(8 Hrs)**

Pseudo versus true multitasking:
Sequential versus Distributed computing
Graph theoretical modelling of resource deadlocks: the value of formal methods
Operational semantics of the CCS/p calculus

Unit 6 **(7 Hrs)**

Worked examples using a mathematical model like the · calculus, or CSP

References and Readings:

1. Robin Milner, Communicating and Mobile Systems: The p Calculus, ISBN-13: 978-0521658690 ISBN-10: 0521658691 (https://moodle.risc.jku.at/pluginfile.php/3407/mod_resource/content/1/A%20Calculus%20of%20Communicating%20Systems%5B1980%5D.pdf)
2. Clay Breshears, The Art of Concurrency: A Thread Monkey's Guide to Writing Parallel Applications, ISBN-13: 978-0596521530 ISBN-10: 0596521537
3. G. Blake Meike, Programming Android
4. Michel Raynal, Concurrent Programming: Algorithms, Principles, and Foundations ISBN-13: 978-3642320262 ISBN-10: 3642320260 Edition: 2013

Outcomes:

- Understanding of concurrency in parallel and distributed computing
- How to design and modularize programs using concurrent tasks
- How to synchronize and communicate between tasks in a concurrent program

CT - 09013 OPERATING SYSTEMS LAB

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Term Work – 50 marks
Practical –50 marks

List of Assignments:

1. Implementation of CPU scheduling algorithms.
2. Process creation and inter process communication using openMP and MPI programming.

3. Deadlock handling-Bankers' algorithm.
4. Demand paging implementation-using algorithms like LRU, LFU,etc.
5. Implementation of first-fit, best-fit and worst fit algorithms for memory allocation.
6. Implementation of reader-writers' problem (with and without readers and writers priority).
7. Thread synchronization using semaphores.
8. Implementation of producer-consumer problem.
9. Define scope for the given problem statement and prepare the following diagram using UML
    - Package Diagram
    - Class Diagram
    - Object Diagram
    - Use cases
    - Interaction or Activity Diagram
    - State chart Diagram
    - Sequence Diagram
    - Collaboration diagram
    - Development Diagram

Outcomes:

- The Systems Programming course gives a brief account of various programs/components that comprise system software.
- This course goes into details of the architecture, concepts and algorithms related to a typical Operating System.
- This course will expose students to internals of Operating Systems which would make them fit for working on System Software related projects, performance-centric applications and thus make them serious programmers as compared to programmers who know only one or more programming.

CT - 09014 COMPUTER ALGORITHMS IN SIGNAL PROCESSING LABORATORY

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Term Work – 50 marks
Oral –50 marks

Following assignments in matlab need to be implemented:

1) Generate of following signals
    1) Continuous sinusoid
    2) Discrete sinusoid
    3) Impulse signal
    4) Unit step
    5) Real exponential
    6) Complex exponential
    7) Triangular
    8) Ramp.
2) Convolution
    a) Write a program to perform convolution of two finite length causal sequence

b) Verify your answer using Conv function MATLAB
c) Perform the convolution using filter function

3) Given a second /third order difference equation, write a program to Find out iteratively first n values of output. Accept n from the user.

4) Given a first order difference equation. E.g. y[n]-0.5y [n-1]=x[n]. The system is initially at rest.
   a) Write your own program to find out unit impulse and unit step response of the system and plot it
   b) Find out unit impulse and unit step response of the system using filter function and plot it.
   c) find out unit impulse response of the system using filter function and unit Step response using convolution and plot it .

      Comment on the result.

5) Noise filtering by n point moving average
   Generate a discrete sinusoid e.g $s[n] = 2[n(0.9)^n]$. Generate a noise signal using rand function. Superimpose this noise signal on discrete signal by doing addition. This is corrupted signal. Plot these three signals on the same graph using plot function by passing different line spec arguments. Now accept n from the user. Using n point averaging on corrupted signal, remove the noise. Plot the filtered signal. Change values of n. see the result. Comment on it.

6) Given the two finite length causal sequence x and y. Find out the autocorrelation of signal x and cross correlation of signal x and y. use the fliplr and conv function for this. Delay the signal e.g. by 4 units. I.e. X[n-4]. Perform the autocorrelation of signal x[n] with its delayed version. Plot it.
   Comment on the result.

7) Write a program to do circular convolution of two periodic signals x[n].
8) Consider a sinusoidal signal e.g. X(t)= Cos200∏t. Take a sampling frequency which satisfies Nyquist criteria.
   1) Generate Discrete time signal for n=0 to say 25.
   2) Accept N (no. of DFT points from the user).
      Take N greater than signal length. Pad remaining zeros to signal and find out the spectra using function FFT ( ). Plot the magnitude and phase plot for this.

   3) Reconstruct the signal x(n) from spectra using ifft().
   4) As N is greater than signal length, increase the signal length at given Sampling frequency by increasing n. (so that n will be equal to N) Again find the spectra and reconstruct the signal using ifft(). Comment upon the reconstruction of signals in both cases
9) To do linear convolution and periodic convolution using FFT.
   Take two finite equal length sequences. Find the linear and periodic convolution Using FFT

10) Write a program to accept pole zeros from the user .Plot those using function Zplane. Determine its rational Z form using function zp2tf.

11) Given the Z transform in rational form, determine the partial fraction expansion using residuez function. Using the same function covert the Z transform given in partial fraction expansion to rational form.

12) a) Find the frequency response of a linear system which is described by constant Coefficient difference equation using freqz function

b) Find the impulse response of a single pole filter using impz function.

13) Design a digital butterwort filter, using bilinear transformation, to low pass an analog signal, sampled at 2 KHz. The pass band edge frequency is 200 Hz and stopband edge frequency is 600 Hz. The ripple allowed in pass band is 1.938db and minimum stopband attenuation is 13.98 db.
Plot the frequency response of your desired filter and check whether the given specifications are met.

Outcomes:

- Though the course is very mathematical, profound understanding of the subject it is essential.
- To bridge a gap between theoretical aspects and practical application, students are exposed to MATLAB based lab assignments.
- Emphasize throughout this course is on practical aspects of DSP.

CT - 09015 SOFTWARE ENGINEERING LABORATORY

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Term Work – 50 marks
Oral –50 marks

1. Define scope for the given problem statement and prepare the following diagram using UML

- Package Diagram
- Class Diagram
- Object Diagram
- Use cases
- Interaction or Activity Diagram
- State chart Diagram
- Sequence Diagram
- Collaboration diagram
- Development Diagram

Department Elective -1 Lab

DE - 09014 ADVANCED MICROPROCESSORS LAB

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Term Work – 50 marks
Oral –50 marks

List of Assignments:

2. Write an Assembly program to write (store) a string in Video RAM with help of BIOS Interrupts & display the written string on terminal along with the address of written string.
3. write an Assembly program to accept any key from user & display the value of key pressed.
   e.g. input – a
   desired output--- "The key entered is 'a' "
4. Write an Assembly program for boot loader. Display a string "My OS".
5. Write a boot loader program. Execute the program on QEMU emulator.
6. Write a boot loader which will move from real mode to protected mode.
   a)Display a string in real mode(e.g "in real mode ")
   b) on pressing a key from keyboard transit from real mode to protected mode (display msg "in protected mode")
7. Prepare a CASE STUDY on Emulator.
8. Programming Assignments on MMX/ SSE/ SSE2 etc.

Outcomes:

- This course gives the concept of multitasking capability of Pentium processor.
- This course exposes the students to memory management, task switching & protection facility in Pentium.
- This course also exposes the students to Micro-controller MCS-51 family architecture.

DE - 09015 OBJECT ORIENTED MODELING LAB

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Term Work – 50 marks
Oral –50 marks

List of Assignments:

1. Choose a hypothetical system of significant complexity and write an SRS for the same.
2. Draw one or more Use Case diagrams for capturing and representing requirements of the system. Use case diagrams must include template showing description and steps of the Use Case for various scenarios.
3. Draw one or more Package diagram to organize and manage your large and complex systems as well as their complex models.
4. Draw activity diagrams to display either business flows or like flow charts.
5. Draw basic class diagrams to identify and describe key concepts like classes, types in your system and their relationships.
6. Draw advanced class diagrams to depict advanced relationships, other classifiers like interfaces.
7. Draw sequence diagrams OR communication diagrams with advanced notation for your system to show objects and their message exchanges.
8. Draw state machine to model the behavior of a single object, specifying the sequence of events that an object goes through during its lifetime in response to events.
9. Draw component diagrams assuming that you will build your system reusing

existing components along with a few new ones.

10. Draw deployment diagrams to model the runtime architecture of your system.

Outcomes:

- Develop the ability to design object oriented architecture for complex applications
- Develop the ability to use tools used in object oriented modeling.
- Master the art of using UML in object oriented modeling
- Understand the theoretical concepts of OOM

DE - 09016 COMPUTER GRAPHICS LAB

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Term Work – 50 marks
Practical –50 marks

List of Assignments:

1. Write a program to implement algorithm for line drawing
2. Write a program to implement algorithm for circle generation
3. Write a program to implement algorithm for filling a polygon using scan-fill method
4. Write a program to implement 2-D transformations
5. Write a program to implement 3-D transformations
6. Write a program to implement concept of segmentation
7. Write a program to implement line clipping
8. Write a program to implement polygon clipping
9. Write a program to implement algorithm for arc drawing
10. Write a program to implement algorithm for removal of hidden surfaces

Outcomes

This course teaches the fundamental concepts in multimedia that are useful in design on modern information systems based on multimedia

- Insight to multimedia file formats that are useful in design of multimedia applications
- State of the art tools and environments for design of multimedia applications using basic components viz. audio, image, and video with considering network protocols.

DE - 09017 Data Mining LAB

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Term Work – 50 marks
Oral –50 marks

List of Assignments:

10. Introduction about launching the Weka tool, Weka Explorer.
1. To perform Preprocessing, Classification and Visualization techniques on Customer dataset.
2. To perform Clustering technique on Customer dataset.
3. To perform Association technique on Customer dataset

4. To implement Data Cleansing applying uppercase and lowercase on first name and last name in C++.
5. Introduction to comparison of various Data Mining Tools.

Outcomes:

- Understand and apply the most current data mining techniques and applications, such as text mining, mining genomics data, and other current issues.
- Creatively deal with data related issues that need to be addressed for successful data mining to be carried out
- Systematically evaluate models/algorithms with respect to their accuracy
- Carry out a self directed piece of practical work that requires the application of data mining techniques in a creative manner

CT CONCURRENT PROGRAMMING IN EMBEDDED SYSTEMS LABORATORY

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
Term Work – 50 marks Practical –50 marks

List of Assignments:

Assignments will be based on the theory course contents.

Outcomes:

- Hands on expertise on working with Concurrent Programming principles and techniques
- Getting exposure to application development on Android Platform

Annexure I

List of Open Elective / Professional Science courses offered by ALL Departments

Sr. No	Department	Course
1	Civil	Finite Elements in Engineering
2	Mechanical	1. Unconventional Machining Processes 2. Modern Control Systems 3. Power Plant Engineering
3	Electrical	1. Industrial Drives 2. Control System Engineering
4	Electronics and Telecommunication	Electronic Communication Systems
5	Metallurgy and Material Science	Composite Materials
6	Instrumentation and Control	Industrial Automation
7	Production	Introduction to ERP & Operations Efficiency
8	Computer Engineering	Information Systems
9	Information Technology	Information Systems
10	Applied Science	1. Humanities Course 2. Constitution of India
11	Innovation Centre	Liberal Learning Course

Annexure II

List of Liberal Learning courses offered at Institute Level

- **Agricultural** – Animal Science, Forestry, Horticulture, Floriculture, Sustainable Agriculture, Veterinary
- **Arts** – Graphic Design, Interior Design, Fashion Design
- **Basic Sciences** – Astronomy, Astro- Physics, Biology, Genetics, Kinesiology, Microbiology, Neuro Sciences.
- **Business** – Administration, Communication, Entrepreneurial studies, Hostel Management, Marketing.
- **Defense Studies** - Military Studies, Naval Studies, Air Force Studies, War strategies.
- **Education** - Education policies, Engineering Education, Teacher Training.
- **Environmental Sciences** – Ecology, Meteorology
- **Linguistics** – Word Language
- **Medicine** – Health Studies Nutrition and dietetics
- **Performing Arts**- Music, Dance Theatre, Cinema
- **Philosophy**- Religious Studies
- **Sports and Athletics**