Bharati Vidyapeeth Deemed University
B.Tech.(I.T.) - 2014 Course
Semester-V

Sr. No	Course Title	Teaching Scheme			Examination Scheme							Credits			
					End Semester Examination	ContinuoAssessment			TW & Practical	TW & Oral	Total Marks				
		L	T	P	Theory	Unit Test	Attendance	Assignments				Theory	Tw & Pr	Tw & Or	Total
1	Theory Of Automata & Formal Languages	3	1	--	60	20	10	10	--	--	100	4	--	--	4
2	Data Communication and Networks	3	--	2	60	20	10	10	--	50	150	3	--	1	4
3	System Programming	3	--	2	60	20	10	10	50	--	150	3	1	--	4
4	Microprocessor Architecture and Programming	3	--	2	60	20	10	10	50	--	150	3	1	--	4
5	Elective-I	3	--	--	60	20	10	10	--	--	100	3	--	--	3
6	Professional skill Development -V	4	--	--	100	--	--	--	--	--	100	4	--	--	4
7	IT Lab-III	--	--	4	--	--	--	--	50		50	--	2	--	2
	TOTAL	**19**	**1**	**10**	**400**	**100**	**50**	**50**	**150**	**50**	**800**	**20**	**04**	**01**	**25**

ELECTIVE- I:

1) Software Testing and Quality Assurance
2) Management of Information System
3) Human Computer Interactions
4) Information Theory & Coding

Bharati Vidyapeeth Deemed University
B.Tech.(I.T.) - 2014 Course
Semester-VI

Sr. N	Course	Teaching Scheme	Examination Scheme					Credits
			End Semeste	Continuous Assessment	T		Tota	

o.	Title				r Examination				W & P R	T W & O R	l Marks				
		L	T	P	Theory	Unit Test	Attendance	Assignments				Theory	Tw & Pr	Tw & Or	Total
1	Operating System	3	--	2	60	20	10	10	50	--	150	3	1	--	4
2	Advanced Database Management Systems	3	--	2	60	20	10	10	--	50	150	3	--	1	4
3	Design and Analysis of Algorithms	3	1	--	60	20	10	10	--	--	100	4	--	--	4
4	Elective-II	3	--	--	60	20	10	10	--	--	100	3	--	-	3
5	Computer Organization and Architecture	3	--	2	60	20	10	10	50	--	150	3	1	--	4
6	Professional skill Development -VI	4	--	--	100	--	--	--	--	--	100	4	--	--	4
7	IT Lab-IV	--	--	4	--	--	--	--	50	--	50	-	2	--	2
	TOTAL	**19**	**1**	**10**	**400**	**100**	**50**	**50**	**150**	**50**	**800**	**20**	**04**	**01**	**25**

ELECTIVE-II:

1) Multimedia Techniques
2) Embedded System
3) Geographical Information System
4) Cyber Law and Security Policies

Optional Subject: Mathematics- IV

Course Title	Teaching Scheme			Examination Scheme							Credits		
				End Semester Examination	Continuous Assessment			TW &PR	TW &OR	Total Marks			
	L	T	P	Theory	Unit Test	Attendance	Assignments				Theory	TW	Total
Mathematics- IV	4	--	--	60	20	10	10	--	--	100	4	-	4
TOTAL	**4**	**-**	**-**	**60**	**20**	**10**	**10**	**-**	**-**	**100**	**4**	**-**	**4**

Theory of Automata and Formal Languages

Teaching Scheme **Examination Scheme** **Credit Allotted**
Theory :3Hrs/Week **End Semester Examination : 60 Marks** **Theory : 4**
Tutorials :1Hr/Week **Continuous assessment : 40 Marks**

Course Objectives:
Students will learn about a variety of issues in the mathematical development of computer science theory, particularly finite representations for languages and machines, as well as gain a more formal understanding of algorithms and procedures.

Course Prerequisites: Students should have knowledge of set theory and state transition diagrams.

Course Outcome:
Students will be able to:

1) Design automata machines for strings given.
2) Write regular expression for the given string and find set of strings if regular expression is given.
3) Write grammar rules for the strings given.
4) Design push down automata for the string and grammar.
5) Design Turing machine and apply the same to solve algorithmic problems.
6) Apply knowledge of TAFL in compiler construction.

UNIT-I **State Machines:** **(06 Hours)**

Abstract Machine, Acceptance of language by machine. Finite Automata (FA) - Definition, Types of FA, NFA and DFA, Language accepted by NFA and DFA, Designing of finite state machines.

Equivalence and difference between DFA and NFA, Inter-conversion between NFA and DFA, Machines with output- Moore and Mealy machines, Designing, Inter-conversion between Moore and Mealy machine.

UNIT-II **Regular Expression (R.E.):** **(06 Hours)**

Operators of RE, Building RE, Precedence of operators, Algebraic laws for RE, Arden's theorem, FA and RE: DFA to RE, RE to DFA, Properties of Regular Languages: Pumping lemma for Regular Languages, Closure and decision properties of regular languages, Equivalence and minimization of automata.

UNIT-III **Grammars:** **(06 Hours)**

Definition, Production rules, Derivation trees, Ambiguous Grammar, Removal of ambiguity, Regular Grammar, Inter-conversion between RE and Grammar, Reduced form of grammar- Removal of unit production, Removal of useless symbols, Removal of epsilon symbol. Linear grammar: left & right linear grammar, Inter-conversion. Chomsky hierarchy of languages, Context Free Grammar- Definition, Context free language (CFL. Normal Forms- Chomsky Normal Form(CNF), Griebach Normal Form(GNF).

UNIT-IV **Push Down Automata (PDA):** **(06 Hours)**

Limitations of FA, PDA: Definition, Uses, Equivalence between FA and PDA, Designing of PDA, Deterministic Push Down Automata and Non-Deterministic Push Down Automata- Definition, Language accepted by PDA, Properties of CFL, Pumping Lemma for CFL. Limitations of PDA, Applications of PDA.

UNIT-V **Turing Machine(TM):** **(06 Hours)**

Definition, Model, Comparison of TM, FSM, PDA, Design of TM, Examples of TM- Combinational TM, Iterative TM, Recursive TM, Universal TM, TM as a language acceptor, Some Problems that cannot be solved by Turning Machines, Language accepted by TM, Recursive sets, Partially recursive functions. Church's Turing hypothesis, Multitask TM, TM limitations, Halting problem.

UNIT-VI **Applications:** **(06 Hours)**

Comparison between FA, PDA, TM. Application of RE: Regular expressions in Unix, GREP utilities of Unix, Lexical analysis and finding patterns in text, Application of CFG: Parser, Markup languages, XML and Document Type Definitions. Applications of PDA and TM.

Assignment List:

1. Solve problems on designing of finite automata.
2. Design and inter-convert Moore and Mealy Machine for same problems.

3. Form grammar rules for language ot set of regular expression or strings given.
4. Design Push Down Automata for grammar or given string.
5. Construct Turing Machine to solve given problem.
6. Compile all the applications of RE, Grammar, TM.
7. Study Assignment on Complexity Theory.

Text Books:

1) John Martin. Introduction to Languages and Theory of Computation. McGrawHill.

2) Michael Sipser. Introduction to The Theory of Computation . ISE.

3) Vivek Kulkarni. Theory of Computation. Oxford University Press.

Reference Books:

1) John E. Hopcoroft, Rajeev Motwani, Jeffrey D-Ullman. Introduction to Automata Theory Languages And Computation. Addison-Wesley.

2) Sanjeev Arora, Boaz Barak. Computational Complexity: A Modern Approach. Cambridge University Press

3) Mishra K.L.P., Chandrasekaran N. Theory of Computer Science: Automata, Languages and Computation. Prentice Hall India.

4) Christos H. Papadimitriou. Computational Complexity. Pearson Education.

5) Cristopher Moore, Stephan Mertens. The Nature of Computation. Oxford University Press

Syllabus for Unit Test:

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV, V and VI

Subject Code: Data Communication and Networks.		
Teaching Scheme	**Examination Scheme**	**Credit Allotted**
Theory : 03 Hrs/Week	**End Semester Examination : 60 Marks**	**Theory :03**
Practical : 02 Hrs/Week	**Continuous assessment : 40 Marks**	**Term Work :01**
	Term Work : 50 Marks	

Course Objectives:

1) Build an understanding of the fundamental concepts of computer networking

2) Familiarize the student with the basic taxonomy and terminology of the computer Networking area.

3) Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

4) Gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Course Prerequisites:

Students should have knowledge of

1) how computer networks operate and the fundamentals of data communication

2) Concepts and fundamental design principles of modern computer networking in a top-down approach, focusing on the Internet's architecture and protocols.

Course Outcome:

Students will be able to:

1) describe network architecture

2) understand basic computer network technology

3) analysis including error detection, error control and flow control.

4) recognize the different types of network topologies and protocols

5) analyze the different types of network devices and their functions within a network

6) familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation

UNIT-I	**Fundamentals of digital communications :**	**(06 Hours)**
	Introduction to digital communications. Definitions of terms. Signal propagation. Signal types: Sine waves, Square waves. Signal parameters: Amplitude, Frequency, and Phase. Channel effects on transmission: Attenuation, Effects of limited bandwidth. Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission impairment, Data Rate Limits, Performance. Digital Transmission: Analog-to-Digital Conversion, Digital-to-Digital Conversion. Analog Transmission: Digital-to-analog Conversion (ASK, FSK, PSK, QAM), Analog-to- Analog Conversion.	
UNIT-II	**Transmission Media and Technologies:**	**(06 Hours)**

	Transmission Media: Guided Media: Twisted pair cables, Co-axial cables, Fiber optic cables. Unguided Media: Radio waves, Microwave, Infrared. Wireless Transmission Medium. Introduction to switching: – Switching, Circuit-Switched Networks, Datagram networks, Concept of Virtual circuit networks, Structure of circuit and packet switch. Types of services: Connection oriented services (Virtual circuits) Connectionless services (Datagrams).	
UNIT-III	**Data transmission mechanisms:**	**(06 Hours)**
	Communication modes: Simplex, Half-duplex, Full – duplex. Transmission modes: Serial transmission, Parallel transmission. Synchronization: Asynchronous transmission, Synchronous transmission. Multiplexing: Frequency division multiplexing, Synchronous time division multiplexing, Statistical time division multiplexing. (Time slots & frames, interleaving, data rate management). Spread Spectrum – FHSS, DSSS.	
UNIT-IV	**Introduction to computer networks :**	**(06 Hours)**
	Introduction to computer networks, Network Topologies: Bus, Star, Ring. Types of networks: Local area networks (LAN), Wide area networks (WAN), Metropolitan Area networks (MAN), Personal area networks (PAN).Layered network model: OSI model, TCP/ IP model. Connecting Devices Repeaters, Hubs, Bridges, Two & Three layer Switches Routers, Gateways, Backbone networks, Concept of VLAN. Data Link Layer – Error correction & detection. Types of errors. Block Coding, Cyclic Codes, Checksum, Data Link control, Framing, Flow and Error Control.	
UNIT-V	**NETWORK LAYER :**	**(06 Hours)**
	Internetworking, IPv4 & IPv4 protocol packet format, IPv6 Protocol & Packet format, IPv4 VS IPv6, Transition from IPv4 to IPv6, Address Resolution protocols (ARP, RARP), BOOTP, DHCP. Address Mapping ICMP, IGMP, ICMPv6. Routing Protocols – Delivery, forwarding, routing, types of routing, routing tables, Unicast Routing, Unicast Routing protocols, RIP, Concepts of OSPF, and BGP & Multicast Routing, Multicast routing protocols.	
UNIT-VI	**TRANSPORT LAYER :**	**(06 Hours)**
	Process-Process Delivery: UDP, TCP and SCTP, Process-to-Process Delivery, User Datagram Protocol (UDP), Congestion Control and Quality of service : Data Traffic, Congestion, Congestion Control (Open Loop, Closed Loop & Congestion control in TCP), Quality Services (QoS), Techniques to improve QoS, Integrated services, Differentiated Services and Flow Characteristics. Introduction to Application Layer – DNS, Remote Logging (Telnet), SMTP, FTP, WWW, HTTP.	

Assignment List:	
1)	Socket programming - TCP and UDP.
2)	Socket programming Client Server using RPC.
3)	Study and demonstration of CISCO packet tracer with data transmission. (Windows/Linux)
4)	Study and demonstration of CISCO packet tracer with data loss. (Windows/Linux)
5)	Study and execution of Network commands.

6)	What are the responsibilities of physical layer, data link layer, network layer?
7)	Explain the differences in the impact on performance of : a) TCP packet being lost or dropped. b) UDP packet being lost or dropped.
8)	Implementation of CRC.
9)	Explain IP 4& IP 6 .Identify the class and default subnet mask of the IP address 217.65.10.7.
10)	Demonstration of Setting Firewall, Enabling /Disabling Ports.
Text Books:	
1)	Data Communications and Networking, Fourth Edition by Behrouza A. Forouzan,TMH.
2)	Computer Networks, A.S.Tanenbaum, 4th edition, Pearson education.
3)	Wayne Tomasi, "Introduction to Data Communication and Networking", 1/e, Pearson Education.
Reference Books:	
1)	Introduction to Data communications and Networking,W.Tomasi,Pearson education.
2)	Data and Computer Communications, G.S.Hura and M.Singhal, CRC Press, Taylor and Francis Group.
3)	An Engineering Approach to Computer Networks-S.Keshav,2nd Edition, Pearson Education.
4)	Understanding communications and Networks, 3rd Edition, W.A.Shay, Cengage Learning.
5)	William Stallings, "Data and Computer Communication", Eighth Edition, Pearson Education, 2000.

Syllabus for Unit Test:

Unit Test -1	**Unit I ,II and III**
Unit Test -2	**Unit IV, V and VI**

System Programming

Teaching Scheme	Examination Scheme		Credit Allotted	
Theory : 3 Hrs/Week	**End Semester Examination**	**: 60 Marks**	**Theory**	**: 3**
Practical: 2Hrs/Week	**Continuous assessment**	**: 40 Marks**	**Tw & Pr**	**: 1**
	Term Work and Practical (Tw & Pr)	**: 50 Marks**		

Course Objectives:

1) To learn & understand fundamentals of system software program as Assembler, Linkers, and loaders.
2) To study phases of compiler in detail.
3) To learn how to design system programs.

Course Prerequisites:
Students should have knowledge of

1) Data Structures
2) Computer Organization
3) Microprocessor
4) Basic Searching & Sorting Algorithms

Course Outcome:
Students will be able to:

1) Understand operating system user view point, fundamentals of Language processing
2) Understand general machine structure and instruction formats**.**
3) Design & implement low level programming using TASM,software for programming development
4) Design & implement System Programs as Macroprocessor
5) Understand various loader schemes and Design of absolute and direct linking loaders
6) Understand Compiler phase
7) use tool Lex for generation of Lexical Analyzer
8) use tool YACC for generation of Syntax Analyzer.

UNIT-I **Introduction:** **(06 Hours)**

Evolution Of the Components of Programming System, Evolution Of Operating System
Operating system User Viewpoint : Functions ,**Operating System User Viewpoint :** Batch Control Language , **Operating System User Viewpoint :** Facilities
Language Processing Activities, Fundamentals of Language Processing, Language processor development t tools

UNIT-II **Machine Structure, Machine Language And Assembly Language** **(06 Hours)**

General Machine Structure : General Approach to a new Machine, Machine Structure : 360 and 370
Machine Language: Long Way, No Looping, Address Modification Using Instructions as Data, Address Modification Using Instructions Using Index Registers, Looping
Assembly Language : An Assembly Language Program, Example using Literals

UNIT-III **Assemblers :** **(06 Hours)**

General Design Procedure, Design Of Assembler,
Table Processing :
Searching: Linear Search, Binary Search
Sorting : Interchange Sort, Shell Sort, Bucket Sort, Radix Exchange Sort, Address Calculation Sort, Comparison of Sorts

UNIT-IV **MACRO Language And The MACROPROCESSOR :** **(06 Hours)**

Macro Instructions, Features of Macro Facility, Implementation Of Restricted Facility : A Two pass Algorithm

UNIT-V **Loaders :** **(06Hours)**

Loader Schemes : Compile-And-Go Loaders, General Loader Scheme, Absolute Loaders, Subroutine Linkages, Relocating Loaders, Direct Linking Loaders,, Other Loader Schemes,
Linkers:
Relocation and linking concepts, Design of linker, self relocating programs, Static and dynamic linking
Design of Absolute and Direct-Linking Loaders

UNIT-VI **Compilers :** **(06 Hours)**
Basics of Compiler:
Recognizing Basic Elements
Recognizing Syntactic Units and Interpreting Meaning
Storage Allocation
Code Generation
Phases Of Compiler :
Lexical Phase, Syntax Phase, Interpretation Phase, Optimization, Storage Assignment, code Generation ,Assembly phase

Text Books:

1) D.M. Dhamdhere ,"Systems Programming and Operating Systems", Tata McGraw-Hill, ISBN-13:978-0-07-463579-7
2) JOHN J.DONOVAN "System Programming ",TATA McGRAW-HILL EDITION
3) Alfred V. Aho, Ravi Sethi, Reffrey D. Ullman, "Compilers Principles, Techniques, and Tools",Addison Wesley, ISBN 981-235-885-4

Reference Books:

1) Terence Parr, "Language Implementation Patterns",SPD,2009
2) Leland L. Beck, "System Software An Introduction to Systems Programming" 3rd Edition, Person Education, ISBN 81-7808-036-2
3) R.K. Maurya Wiley-dreamtech , "System Programming and Compiler Construction"
4) Srimanta Pal ," System Programming " OXFORD Publication
5) Richard Anthony," **Systems Programming: Designing and Developing Distributed Applications"** 1st Editio

Assignment List:

1 To Study Fundamentals of language processing.

2 Write an assembly language program using Literals.

3 Write an assembly language program for table processing.(Searching & sorting)

4 To study the design of two pass Macroprocessor.

5 To study the phases of compilers.

6 To study the design of Absolute and Direct-Linking Loaders

7 Use of tool Lex for generation of Lexical Analyzer.

8 Use of tool YACC for generation of Syntax Analyzer.

Syllabus for Unit Test:

Unit Test -1 Unit I ,II and III
Unit Test -2 Unit IV, V and VI

Microprocessor Architecture and Programming

Teaching Scheme	Examination Scheme		Credit Allotted	
Theory : 3 Hrs/Week	**End Semester Examination**	**: 60 Marks**	**Theory**	**: 3**
Practical : 2 Hrs/Week	**Continuous assessment**	**: 40 Marks**	**Tw & Pr**	**: 1**
	Term Work and Practical (Tw & Pr)	**: 50 Marks**		

Course Objectives:

1) To study 8-bit Microcontroller
2) To study Advanced Computer Architectures
3) To study 16-bit Microprocessor and Peripherals

Course Prerequisites:
Students should have knowledge of

1) Basic Electronics Engineering

Course Outcome:
Students will be able to:

1) Understand basics of microprocessors, 16-bit microprocessor architecture
2) Understand various microprocessor peripherals and their interfacing with 8086
3) Understand assembly language programming concepts
4) Understand advanced computer architectures
5) Understand 8-Bit Microcontroller architecture, Programming and Interfacing
6) Understand multiprocessor and multicore architecture.

UNIT-I **16-Bit Microprocessor Architecture:** **(06 Hours)**

Basic microprocessor architecture, Bus concept, Intel 8086 microprocessor: Features, Block diagram and pin configuration, Max/min mode, Instruction cycles, Read Write cycles. Memory segmentation,8086 Memory organization, , Instruction pipelining, Instruction set, 8086 Interrupt structure

UNIT-II **8086 Assembly Language Programming:** **(06 Hours)**

Programmers model of 8086, 8086 addressing modes, Assembler directives, DOS and BIOS interrupts, Function calls, Procedures and Macros, EXTRN and PUBLIC directives, FAR procedure, Turbo debugger, Writing programs in C using int86, int86x, intdos, intdosx functions.

UNIT-III **NDP and Peripherals :** **(06 Hours)**

8087 Architecture, Communication and Interfacing with 8086, Writing basic programs using 8087, Architecture, Modes and Interfacing of following peripherals with 8086 : 8255 Programmer Peripheral Interface, 8259 Programmable Interrupt Controller, 8253 Programmable Interval Timer, 8237 DMA Controller, Designing 8086 based applications using above peripherals

UNIT-IV **Advanced Processor Architectures :** **(06 Hours)**

Multiprocessor Architectures : Closely coupled and Loosely coupled, RISC and CISC Architectures, SPARC, Superscalar Architecture, Multicore Architecture, Intel i3, i5 and i7 architectures

UNIT-V **8-bit Microcontroller-I** **(06 Hours)**

Microcontroller 8051 Architecture, On-Chip data memory and program memory organization, Programming of 8051 : Register set, Register bank, SFRs, Instruction format & addressing modes. Instruction set. External data memory and program memory & its interfacing, I/O ports programming.

UNIT-VI **8-bit Microcontroller-II** **(06 Hours)**

Interrupts structure and Response. Timers/counters and their programming, Serial port and programming, Interrupt programming, Design of minimum system using 8051 micro-controller for various applications, Software & hardware tools for development of microcontroller based system such as assembler, compiler, IDÉ, Emulators, debugger, programmer, development board, DSO, Logic Analyzer.

Text Books:

1) Microprocessor Architecture and Interfacing : Ramesh Gaonkar
2) Microprocessor and Interfacing : Douglas V.Hall
3) 8086 Microprocessor: Programming and Interfacing, Keneth Ayala
4) Microprocessors and Microcontrollers : N.Senthil Kumar
5) 8051 microcontroller & embedded system, Mazidi
6) IBM PC Assembly Language Programming, Peter Abel

Reference Books:

1) Liu, Gibson, "Microcomputer Systems: The 8086/88 Family", 2nd Edition, PHI,2005
2) Ray Dunkon, "Advanced MSDOS Programming", 2nd Edition, BPB Publication.
3) Kip Irvine, "Assembly language for IBM PC", PHI, 2nd Edition, 1993
4) Intel Microprocessor and peripheral Handbook: Volume 1
5) Yashwant Kanitkar, "TSR through C", BPB Publication, 1995, ISBN 81- 7029-520-3.

List of Assignments :

1) Programs based on numerical computing, code conversion
2) Programs based on string processing
3) Programs using EXTRN, PUBLIC directives
4) Creating library of macros and using it in programs.
5) Programs in C using int86, int86x, intdos, intdosx functions
6) Simple 8051 programs based on 8085 development board
7) Program on Timer programming: ISR based

8) Program with interfacing : a) A/D Convertor
b) D/A Convertor
c) Stepper motor

Syllabus for Unit Test:
Unit Test -1 Unit I ,II and III
Unit Test -2 Unit IV, V and VI

Elective-I : Software Testing and Quality Assurance

Teaching Scheme	Examination Scheme		Credit Allotted
Theory : 3 Hrs/Week	**End Semester Examination**	**: 60 Marks**	**Theory : 3**
	Continuous assessment	**: 40 Marks**	

Course Objectives:

This course equips the students with a solid understanding of:

1) Practices that support the production of quality software
2) Software testing life cycle and activities
3) Software Quality Assurance and Models

Course Prerequisites:

Students should have knowledge of

Software Engineering, Software development life cycles, methodologies

Course Outcome:

Students will be able to:

1) Understand the concepts of software testing
2) Learn techniques of dynamic black box testing
3) Learn techniques of dynamic white box testing
4) Learn techniques of static black and white box testing
5) Understand special Software Testing Activities
6) Study software quality assurance, models

UNIT-I **Introduction to Software Testing** **(06 Hours)**

Basics of Software Testing, Software quality, Need of software testing, Testing principles, Goals, Software Testing Life Cycle(STLC), Error, Fault, Failure, Defect Life Cycle, Testing terms and definitions: Precision and Accuracy, Verification and Validation, Quality and Reliability, Testing and Quality Assurance, Software test plan (IEEE format), Software Failure Case Studies

UNIT-II **Dynamic Testing: Black Box Testing** **(06 Hours)**

Need of Black Box Testing, Black box testing concept, Requirement analysis, Test case design criteria, Testing methods, requirement based testing, positive & negative testing, boundary value analysis, equivalence class testing, state based testing, cause effect graph based testing, error guessing, design of test cases

UNIT-III **Dynamic Testing: White Box Testing** **(06 Hours)**

Need of white box testing, White box testing concept, Logic coverage criteria, Structure- Control flow testing, Cyclomatic complexity, Loop Testing, Data flow testing, Slice based testing, Mutation Testing, Design of test cases, Challenges in White box testing.

UNIT-IV **Static Testing:** **(06 Hours)**

Static Black Box Testing: testing the specification, performing a high level review of the specification, low- level specification test techniques

Static White Box Testing: examining the design and code, Formal reviews: peer reviews, walkthroughs, inspections, coding standards and guide lines, generic code review checklist.

UNIT-V **Software Testing Activities:** **(06 Hours)**

Levels of testing: Unit testing, Integration testing, system testing, Acceptance Testing

Special tests: GUI testing, compatibility testing, configuration testing, recovery testing, stress testing, load testing, recovery testing, regression testing, usability testing, documentation testing, website testing

Debugging process and tools, Software testing tools: Static and Dynamic testing tools, Automation testing and tools

UNIT-VI **Software Quality Assurance:** **(06 Hours)**

Software quality, Quality cost, Quality attribute, Quality assurance, Quality control & assurance, Quality management, Quality management and project management, Methods of quality management, SQA models: ISO 9126, Capability Maturity Model(CMM), Software Total Quality Management, Six Sigma.

Text Books:

1) Software Testing Principles and Practices By Naresh Chavan Oxford Publication

2) Software Testing Principles and Tools By M.G. Limaye TMG Hill Publication

3) Software Testing, Second Edition By: Ron Patton, Pearson Education

Reference Books:

1) Metric and Model in Software Quality Engineering, Stephen H Kan, Pearson Education

2) Effective methods for software testing by William Perry , Willey Publication

3) Foundation of software testing by Dorothy Graham, Erik Van Veenendaal, CENGAGE learning

4) Introducing to Software Testing, Louis Tamres, Addison Wesley Publications

5) Software Quality Assurance, Daniel Galin, Pearson Education.

Syllabus for Unit Test:
Unit Test -1 Unit I ,II and III
Unit Test -2 Unit IV, V and VI

Elective-I : Management of Information System

Teaching Scheme	Examination Scheme		Credit Allotted
Theory : 3 Hrs/Week	End Semester Examination	: 60 Marks	Theory :3
	Continuous assessment	: 40 Marks	

Course Objectives: To

1) Understand significance management of information.
2) Use technology and resources for effective usage of information.

Course Prerequisites:
Students should have knowledge of

1) Introduction to computer
2) Significance of Information needed for business

Course Outcome:
Students will be able to:

1) Understand necessity of information.
2) Use effective technique to maintain the data.
3) Analyze information using tools and techniques to increase the business.
4) Use huge data available due to social networking site and internet.
5) Apply information analysis for decision making.
6) Apply adequate tool for MIS

UNIT-I **Introduction of MIS** **(06Hours)**

Architecture of MIS, data storage, processing and formatting. Need of MIS, pre requisites for MIS.

UNIT-II **Transaction processing System** **(06 Hours)**

Information Technology, Information extraction, Information retrieval, Approach and algorithms used to store and manage data.

UNIT-III **Information Filtration and analysis:** **(06 Hours)**

Information extraction, representation of useful information, derives various forms of information, reporting useful for business.

UNIT-IV **Social Engineering:** **(06 Hours)**

Effective use of social engineering sites, use of internet to increase the reach, Extract the information and deliver the necessary things in adequate form at social network.

UNIT-V **Decision Support System:** **(06 Hours)**

Data Analytics, business intelligence, chart and report generation , logical conclusion to ease the process of decision making

(06 Hours)

UNIT-VI

Applications of MIS

ERP, CRM, SCM, KMS, case study of SAP, openbiz

Assignment List:

1) Analyze different forms of information required for particular business domain.
2) Use technology to collect the information.
3) Design expert system to manage the information for business.
4) Use information extraction approaches and algorithms.
5) Analyze valuable information by representing it in suitable format.
6) Use social engineering in decision making.
7) Use google analytics to create complete history of user, needed for decision making.
8) Apply various filtration techniques using OLAP for decision making.
9) Understand working of SAP – case study.
10) Understand working of moodle– case study.

Text Books:

1) Management Information Systems, Laudon and Laudon, 7th Edition, Pearson Education Asia.
2) Management Information Systems, Jawadekar, Tata McGraw Hill.
3) Management Information Systems, Davis and Olson, Tata McGraw Hill.

Reference Books:

1) Decision Support Systems and Intelligent Systems, Turban and Aronson, Pearson Education Asia .
2) Management Information Systems, Schulthesis, Tata McGraw Hill.
3) Management Information Systems - Sadagopan, Prentice Hall.
4) Management Information Systems - Jayant Oke.
5) MIS: Managing Information Systems in Business, Government and Society , Rahul De.

Syllabus for Unit Test:

Unit Test -1 **Unit I ,II and III**
Unit Test -2 **Unit IV, V and VI**

Elective-I : Human Computer Interaction

Teaching Scheme	Examination Scheme		Credit Allotted	
Theory : 3 Hrs/Week	End Semester Examination	: 60 Marks	Theory	: 3
	Continuous assessment	: 40 Marks		

Course Objectives:

To build interaction between human and computer using Graphical User Interface,Design processes, software tools and various interaction devices

Course Prerequisites:

Students should have knowledge of

1)Analysis and design of software

Course Outcome:

Students will be able to:

1)Understand User interface design
2)Understand Graphical user interface and its characteristics
3)Identify various design processes
4)Understand screen designing
5)Understand Windows, Components and Software Tools
6)Identify various interaction devices

UNIT-I **Introduction:** **(06 Hours)**

Importance of user interface, Importance of good design, Benefits of good design,A brief history of screen design.

UNIT-II **The Graphical User Interface:** **(06 Hours)**

Popularity of Graphics,The concept of direct manupation,Graphical system,Characteristics,Web user-Interface popularity,characteristics-Principles of user interface.

UNIT-III **Design process:** **(06 Hours)**

Human interaction with computers,importance of human characteristics,Human consideration,Human interaction speeds and understanding business junctions.

UNIT-IV **Screen Designing:** **(06 Hours)**

Design goals-Screen planning and purpose,organizing screen elements,ordering of screen data and content-screen navigation and flow,information retrieval on web-statistical graphics-Technological

consideration in interface design

UNIT-V **Windows,Components and Software Tools:** **(06 Hours)**

Windows: New and navigation schemes,selection of window,selection of devices based and screen based controls.

Components: Text and messages,Icons,Multimedia,colors

Software Tools: Specification methods,interface-Building Tools.

UNIT-VI **Interaction Devices** **(06 Hours)**

Keyboard and function keys-Pointing devices-speech recognition digitization and genenration-image and video displays-drivers.

Assignment List:

1) A Case study on Graphical User Interface
2) A Case study on Design process
3) A Case study on Screen Designing
4) A Case study on Windows and Components
5) A Case study on Software Tools
6) A Case study on Interaction Devices

Text Books:

1) Designing the user interface,Third edition,Ben Shneiderm ann,Pearson Education Asia

2) The essential guide to user interface design,Wilbert O Galitz,Wiley Drdeam Tech

Reference Books:

1) User Interface Design,soren Lauesen,Pearson Education

2) Human Computer Interaction,Alan Dix,janet Fincay,GreGoryd,Abowd,Russell Bealg,Pearson Education

Syllabus for Unit Test:

Unit Test -1 **Unit I ,II and III**

Unit Test -2 **Unit IV, V and VI**

Elective-I : Information Theory & Coding

Teaching Scheme	Examination Scheme	Credit Allotted
Theory :3Hrs/Week	End Semester Examination: 60 Marks	Theory:3
	Continuous assessment : 40 Marks	

Course Objectives:

1) To deeply understand the mathematics of Information Theory and its physical meaning

2) To understand various channel coding techniques

3) Students will be introduced to convolution and block codes, decoding techniques, and automatic repeat request

Course Prerequisites:

Students should have knowledge of

1) Student should have knowledge of Communications Systems or equivalent.

2) Knowledge of calculus, algebra, and probability

Course Outcome:

Students will be able to:

1) This course covers the fundamental concepts of information theory and error control coding.

2) Students will be introduced to the basic notions of information and channel capacity.

3) Students will be understood how error control coding techniques are applied in communication systems.

4) Design a data compression scheme using suitable source coding technique.

5) Design a convolution coding scheme for a communication system.

6) Evaluate performance of a communication system

UNIT-I **Introduction:** Introduction to Information Theory, uncertainty and information, number theory, group theory average mutual information and entropy, average information content of symbols in long independent sequences, Average information content of symbols in long dependent sequence, Mark-off statistical model for information source, source coding theorem. **(06 Hours)**

UNIT-II **Channel Capacity:** Channel models, channel capacity, Encoding of the source output, Shannon‟s encoding algorithm. Communication Channels, Discrete communication channels, Continuous channels. information capacity theorem, Entropy and information rate of mark-off source, random selection of codes. **(06 Hours)**

UNIT-III **Coding:** Error control coding: linear block codes and their properties, decoding of linear block code, perfect codes, Shannon-Fano coding, Huffman coding, Arithmetic coding, Lempel-Ziv algorithm, run- **(06 Hours)**

length encoding and rate distortion function hamming codes, and optimal linear codes and MDS codes .

UNIT-IV **Cyclic Codes:** Polynomials, division algorithm for polynomials, a method for generating cyclic codes, matrix description of cyclic codes, burst error correction, fire codes, golay codes, CRC codes, circuit implementation of cyclic codes. BCH codes: minimal polynomials, generator polynomial for BCH codes, decoding of BCH codes, Reed-Solomon codes and nested codes. **(06 Hours)**

UNIT-V **Convolution Codes:** Tee codes and trellis codes, polynomial description of convolution codes, distance notions for convolution codes, generation function, matrix description of convolution codes, viterbi decoding of convolution codes, distance bounds for convolution codes, turbo codes and turbo decoding. **(06 Hours)**

UNIT-VI **Trellis Coded Modulation:** Concept of coded modulation, mapping by set partitioning, Ungerboeck's TCM design rules, TCM decoder, Performance evaluation for Additive White Gaussian Noise (AWGN) channel, TCM for fading channels, applications and use cases of ITCT, applications of coding technique in cryptography, cryptosystem like ECC(Ellyptical curve cryptography). **(06 Hours)**

Assignment List:

1) A code is composed of dots and dashes. Assume that the dash is 3 times as long as the dot and has one-third the probability of occurrence. (i) Calculate the information in dot and that in a dash; (ii) Calculate the average information in dot-dash code; and (iii) Assume that a dot lasts for 10 ms and this same time interval is allowed between symbols. Calculate the average rate of information transmission.

2) State Shannon-Hartley‟s law. Derive an equation showing the efficiency of a system in terms of the information rate per Unit bandwidth. How is the efficiency of the system related to B/W?

3) Consider a source with 8 alphabets and respective probabilities as shown: A B C D E F G H 0.20 0.18 0.15 0.10 0.08 0.05 0.02 0.01 Construct the binary Huffman code for this. Construct the quaternary Huffman and code and show that the efficiency of this code is worse than that of binary code

4) If Ci and Cj an two code vectors in a (n,k) linear block code, show that their sum is also a code vector and Show CHT =0 for a linear block code.

5) A) Write short notes on BCH codes B) Draw the general block diagram of encoding circuit using (n-k) bit shift register and explain its operation.

6) What are convolutional codes? How is it different from block codes? Implement a convolutional code with a viterbi (trellis) and a sequential decoder.

7) Write a program to ensure to ensure integrity of packet transfer using coding technique similar top CRC

8) Analysis and study of crypt tool.

Text Books:

1) Ranjan Bose, "Information Theory, Coding and Cryptography", Tata McGraw- Hill, 2002.

2) K. Sam Shanmugam, John Wiley "Digital and analog communication systems", 1996

Reference Books:

1) Viterbi, "Information Theory and Coding", McGraw-Hill, 1982.

2) John G. Proakis, "Digital Communications", McGraw-Hill, New edition, 2000.

3) Gareth A. Jones and J. Mary Jones, "Information and Coding Theory", Springer Undergraduate Mathematics Series, 2000. 104

4) Glover and Grant; "Digital Communications", Pearson Ed. 2nd Ed 2008

Syllabus for Unit Test:

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV, V and VI

IT Lab-III

Teaching Scheme	Examination Scheme	Credit Allotted
Practical : 4Hrs/Week	Term Work and Practical (Tw & Pr) : 50Marks	Tw & Pr :2

Course Objectives: To

1) Understand web environment for building the application.
2) Implement web application.
3) Implement server side programming.
4) Analyze life cycle servlet.
5) Analyze life cycle JSP.

Course Prerequisites:

Students should have knowledge of

1) Core Java
2) Scripting languages

Course Outcome:

Students will be able to:

1) Undesrstand the lifecycle of web application
2) Understand flow of request and data in web application.
3) Implement relevant technology based on the functionalities involved in the respective web application.
4) Design acompetative web application which will work real web environment.
5) Implement server side technology.
6) Apply server side programming to implement web application.

UNIT-I **JDBC:** **(06 Hours)**

Introduction to JDBC, JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases

UNIT-II **Servlet Basics:** **(06 Hours)**

Web Application Basics, Architecture and challenges of Web, application. Introduction to servlet, Servlet life cycle, Developing and Deploying Servlets, Exploring Deployment Descriptor (web.xml). Handling Request and Response Initializing a Servlet, Accessing Database, Servlet Chaining, Session Tracking & Management, Dealing with cookies.

UNIT-III **Servlet Advanced:** **(06 Hours)**

Transferring Request, Accessing Web Context, Passing INIT and CONTEXT Parameter, Sharing information using scope object Controlling concurrent access User Authentication, Filtering Request and Response, Programming Filter, Filter Mapping, Servlet Listeners

UNIT-IV **Java Server Pages : Standard approach:** **(06 Hours)**

Basic JSP Architecture, Life Cycle of JSP (Translation, compilation), JSP Tags and Expressions, Role of JSP in MVC-2, JSP with Database, JSP Implicit Objects.

UNIT-V **Java Server Pages : Customized approach:** **(06 Hours)**

Tag Libraries, JSP Expression Language (EL), Using Custom Tag, JSP Capabilities Exception Handling Session Management Directives JSP with Java. Case study of struts and spring framework.

UNIT-VI **RMI (Remote Method Invocation) & EJB (Enterprise java Beans):** **(06 Hours)**

Bean RMI overview, RMI architecture, concept of stub and skeleton, Example demonstrating RMI ,Introduction to EJB , Types of enterprise beans Advantages of enterprise beans, The Life Cycles of Enterprise Beans, Types of EJB.

Assignment List:

1) Maintain record of students and perform CRUD functionality.
2) Write a program to redirect a request using a dynamic approach.
3) Write a program to pass the data using session
4) Write a servlet to remove spam.
5) Maintain the record of faculty member using jsp action tags and directives.
6) Design a tag to perform the necessary editing in a given report.
7) Design reusable components of the form using taglib.
8) Perform multiplication of two numbers using RMI.
9) Implement submission of assignment and evaluation of the same using EJB.
10) Understand working of framework – struts, spring- case study

Text Books:

1) SCWCD Exam Study Kit: Java Web Component Developer Certification Hanumant Deshmukh, Jignesh Malavia, Manning Publication
2) Head First Servlets and JSP , by Bryan Basham (Author), Kathy Sierra (Author), Bert Bates, Head First Publication
3) J2EE: The complete Reference, Jim Keogh (Author)

Reference Books:

1) OCEJWCD Study Companion: Certified Expert Java EE 6 Web Component Developer (oracle Exam 1Z0-899), by Charles E. Lyons (Author), Garner Press.
2) JDBC, Servlets and JSP Black Book Paperback , by Santosh Kumar K. (Author), Kogent Solutions Inc.
3) Java Server Programming Java EE7 (J2EE 1.7): Black Book

Kogent Learning Solutions Inc

4) Sun Certified Enterprise Architect for Java EE Study Guide(Second edition) Mark Cade (Author)

5) Sun Certified Enterprise Architecture for J2EE Technology Study
Mark Cade (Author), Simon Roberts (Author)

Operating System

Teaching Scheme	Examination Scheme		Credit Allotted	
Theory : 3 Hrs/Week	**End Semester Examination**	**: 60 Marks**	**Theory**	**: 3**
Practical : 2 Hrs/Week	**Continuous assessment**	**: 40 Marks**	**Tw & Or**	**: 1**
	Term Work and Oral (Tw & Or)	**: 50 Marks**		

Course Objectives:

1) To Introduce basic concepts and functions of modern operating systems
2) To Understand the concept of process, and thread management
3) To Understand how the resources are scheduled and managed
4) To Understand the concepts of process synchronization and deadlock
5) To know the concept of I/O and File management
6) To Understand various Memory management techniques
7) To be aware of latest trends in Operating Systems

Course Prerequisites:

Students should have knowledge of

1) Computer Organization
2) Data Structure

Course Outcome:

Students will be able to:

1) Possess knowledge of the role of Operating Systems and their types.
2) Apply the concept of a process, thread and scheduling algorithms.
3) Apply the concepts of process synchronization and how it is achieved.
4) Realize the concept of deadlock and different ways to handle it.
5) Realize various memory management techniques, concept of I/O management and File system.
6) Realize latest trends and techniques in various operating systems

UNIT-I **Operating System Overview** **(06 Hours)**

Operating System Objectives and Functions, The Evolution of Operating Systems, Developments Leading to Modern Operating Systems, Virtual Machines, OS Design Considerations for Multiprocessor and Multicore architectures, Microsoft Windows Overview, Modern UNIX Systems, Linux, Android. Booting Process of all the above operating systems.

UNIT-II **Process Description and Control** **(06 Hours)**

Process: Concept of a Process, Process States, Process Description, Process Control (Process creation, Waiting for the process/processes, Loading programs into processes and Process Termination), Execution of the Operating System.

Threads: Processes and Threads, Concept of Multithreading, Types of Threads, Thread programming Using pthreads, Multicore processors and threads, Linux Process and Thread Management,

Android Process and Thread Management.
Scheduling: Uniprocessor Scheduling Types of Scheduling, Scheduling Algorithms, and Thread Scheduling, An introduction to Multiprocessor and RealTime Scheduling, Traditional UNIX Scheduling, Linux Scheduling.

UNIT-III **Concurrency: Mutual Exclusion and Synchronization** **(06 Hours)**

Concurrency: Process/thread Synchronization and Mutual Exclusion Principles of Concurrency, Requirements for Mutual Exclusion, Mutual Exclusion: Hardware Support, Operating System Support (Semaphores and Mutex), Programming Language Support (Monitors),
Classical synchronization problems: Readers/Writers Problem, Producer and Consumer problem.
Concurrency: Deadlock and Starvation Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock detection, An Integrated Deadlock Strategy, Example: Dining Philosophers Problem, Linux interprocess communication and concurrency mechanisms, Android Interprocess communication mechanisms and concurrency mechanisms

UNIT-IV **Memory Management** **(06 Hours)**

Memory Management: Memory Management Requirements, Memory Partitioning: Fixed Partitioning, Dynamic Partitioning, Buddy System, Relocation, Paging, Segmentation.
Virtual Memory: Hardware and Control Structures, Operating System Software, Linux Memory Management, Windows Memory Management, Android Memory Management

UNIT-V **Input/Output And Files** **(06 Hours)**

I/O Management and Disk Scheduling: I/O Devices, Organization of the I/O Function, Operating System Design Issues, I/O Buffering, Disk Scheduling, Disk Cache, Linux I/O.
File Management: Overview, File Organization and Access, File Directories, File Sharing, Record Blocking, Secondary Storage Management, Linux Virtual File System, Android File Management.

UNIT-VI **Recent And Future Trends In OS** **(06 Hours)**

Linux Kernel Module Programming, Embedded Operating Systems: Characteristics of Embedded Systems, Embedded Linux, and Application specific OS. Basic services of NACH Operating System.
Introduction to Service Oriented Operating System (SOOS), Introduction to Ubuntu EDGE OS, etc.

Assignment List:

1) Study of hardware and software requirements of different operating systems (UNIX,

LINUX, WINDOWS XP, WINDOWS 7/8/10)

2) Implement CPU scheduling policies a) SJF (b) Priority (c) FCFS (d) Multi-level queue

3) Implement file storage allocation techniques: (a) Contiguous (using array) (b) Linked –list (using linked list) (c) Indirect allocation (indexing)

4) Implementation of Contiguous allocation techniques: (a) Worst-Fit (b) Best-Fit (c) First-Fit

5) Calculation of external and internal fragmentation.

6) Implementation of Compaction for the continually changing memory layout and calculate total movement of data.

7) Implementation of resource allocation graph (RAG).

8) Conversion of resource allocation graph (RAG) to wait-for-graph (WFG) for each type of method used for storing graph.

9) Write a program where parent process counts number of vowels in the given sentence and child process will count number of words in the same sentence. Use FORK and JOIN construct.

10) Implement the solution for Bounded Buffer (Producer-Consumer) problem using inter process communication technique – Semaphores.

11) Study latest trends in various operating systems.

Text Books:

1) William Stallings, Operating System: Internals and Design Principles, Prentice Hall, 8th Edition, 2014, ISBN10: 0133805913 • ISBN13: 9780133805918

2) Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons ,Inc., 9th Edition,2012, ISBN 9781118063330

3) Maurice J. Bach, "Design of UNIX Operating System", PHI

Reference Books:

1) Tom Adelstein and Bill Lubanovic, Linux System Administration, O'Reilly Media, Inc., 1st Edition, 2007.ISBN10: 0596009526 | ISBN13: 9780596009526

2) Harvey M. Deitel, Operating Systems, Prentice Hall, 3rd Edition,2003, ISBN10: 0131828274 | ISBN13: 9780131828278

3) Andrew S. Tanenbaum, Modern Operating System, Prentice Hall, 3rd Edition, 2007,ISBN10: 0136006639 | ISBN13: 9780136006633

4) Operating System in depth by Thomson

Syllabus for Unit Test:

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV, V and VI

Advanced Database Management Systems

Teaching Scheme		Examination Scheme		Credit Allotted	
Theory	**:3Hrs/Week**	**End Semester Examination**	**: 60 Marks**	**Theory**	**:3**
Practical	**:2Hrs/Week**	**Continuous assessment**	**: 40 Marks**	**Tw &Pr**	**:1**
		Term Work and Practical (Tw & Pr)	**: 50 Marks**		

Course Objectives:

Exploring the working of large scale and emerging database management systems
Study and analysis of query processing and query optimization

Course Prerequisites:

Student should be well aware of database management systems, analysis of data structure and algorithms and sufficient programming experience

Course Outcome:

Students will be able to:

1) Understand the concepts of Object Oriented Database Management Systems
2) Understand various system architectures
3) Understand the processes of query processing and optimization
4) Understand Data warehousing concepts
5) Understand Data mining concepts
6) Familiarize with emerging database applications

UNIT-I **Object-Oriented and Object Relational Databases** **(06 Hours)**

Overview of Object-Oriented Concepts, Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods, and Persistence, Type and Class Hierarchies and Inheritance,

Complex Objects, Overview of the Object Model of ODMG, The Object Definition Language, The Object Query Language, Object Database Conceptual Design, Other Objected-Oriented Concepts

Database design for an ORDBMS–Nested relations and collections, Implementation and Related Issues for Extended Type Systems, The Nested Relational Model, Extended ER diagram, Comparison of OODBMS, ORDBMS and RDBMS.

UNIT-II **Database-System Architectures** **(06 Hours)**

Centralized and Client –Server Architectures, Server System Architectures

Parallel Databases: Introduction to Parallel Systems , I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Design of Parallel Systems.

Distributed Databases: Introduction to Distributed Systems, Homogeneous and Heterogeneous Databases, Distributed Data Storage, Availability, Heterogeneous Distributed Databases.

UNIT-III **Query Processing and Query Optimization** **(06 Hours)**

Query Processing : Overview, Measures of Query Cost, Algorithms for Selection, Sorting and Join Operation, Evaluation of Expressions.

Query Optimization : Overview, Transformation of Relational Expressions, Estimating Statistics of Expression, Results, Choice of Evaluation Plans, Semantic Query Optimization, Materialized Views, Introduction to dynamic query evaluation.

UNIT-IV **Data Warehousing and OLAP** **(06 Hours)**

Characteristics of Data warehouse, Data marts, Building data warehouse, Architectural strategies and organizational issues, Design considerations, Data Content, Metadata, Distribution of data, Tools for Data Warehousing, Applications of Data warehousing.

OLAP and OLTP, Data Modeling- Star and snowflake schema.

UNIT-V **Data Mining and information retrieval** **(06 Hours)**

Overview of data mining, Steps of data mining, Association Rules, Classification, Clustering, Applications of data mining

Decision support systems, Information retrieval systems, Web search engines, Directories.

UNIT-VI **Emerging Database Technologies and Applications** **(06 Hours)**

Time in Databases, Spatial and Geographic Data, Geographic Information Systems, Genome Data Management, Multimedia Databases, Mobility and Personal Databases, Mobile Databases.

Performance Tuning, Performance Benchmarks, Standardization, Application Migration, Transaction-Processing Monitors.

Assignment List:

1. Study and implementation of nested relations using SQL.

2. Study and implementation of Object types and collection in SQL .

3. Study and design of Extended ER diagram for any given DBMS.

4. Study (and implementation if possible) of web search engine (Lucene).
5. Study and implementation of selection, sorting and join operations.
6. Study and implementation of semantic queries.
7. Study, implementation and comparison of Views and Materialised views.
8. Study, implementation and comparison of Snowflake and Star schema
9. Study and demonstrating of OLAP operations in SQL.
10. Implementation of triggers in PL/SQL (Performance statistics and diagnostics)

Text Books:

1) Fundamentals of Database Systems, Sixth Edition, Ramez Elmasri, Shamkant B. Navathe, Pearson Education
2) Database System Concepts, Seventh Edition, Avi Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
3) Data Warehousing: Concepts, Techniques, Products and Applications, 3rd Edition, C.S.R. PRABHU,PHI Learning Pvt. Ltd.,

Reference Books:

1) Database Management Systems, 3rd Edition, Raghu Ramakrishnan and Johannes Gehrke, Mcgraw Hill Education
2) An Introduction to Database Systems, 8th Edition, C.J. Date, Pearson
3) Database Systems: A Practical Approach to Design, Implementation, and Management, Third Edition, Thomas Connolly, Carolyn Begg, Pearson

Syllabus for Unit Test:

Unit Test -1 **Unit I ,II and III**
Unit Test -2 **Unit IV, V and VI**

Design and Analysis of Algorithms

Teaching Scheme	Examination Scheme		Credit Allotted
Theory : 3 Hrs/Week	**End Semester Examination**	**: 60 Marks**	**Theory : 4**
Tutorials : 1Hr/Week	**Continuous assessment**	**: 40 Marks**	

Course Objectives:

Students will be able to find a best suited algorithmic approach as a solution for given problem.

Course Prerequisites:

Students should have knowledge advanced data structures, graph theory and algorithmic steps in problem solving.

Course Outcome:

Students will be able to:

1) Understand fundamental data structures and with the manner in which these data structures can best be implemented.

2) Learn how to analyze algorithms and estimate their worst-case and average-case behavior.

3) Ability to analyze and design algorithms divide and conquer approach.

4) Ability to understand and design algorithms using greedy strategy and dynamic programming

5) Learn fundamental knowledge of computational complexity, approximation and randomized algorithms.

6) Apply subject knowledge in various scenarios .

UNIT-I **Introduction:** **(06 Hours)**

Elementary data structures: Linear data structures, Graphs, Trees. Algorithm: Understanding problem, Designing, Analyzing, and Coding. Mathematical analysis of algorithms, Standard and Asymptotic Notations.

UNIT-II **Brute Force and Exhaustive Search:** **(06 Hours)**

Selection Sort and Bubble Sort, Sequential Search and Brute-Force String Matching, Closest-Pair and Convex-Hull Problems by Brute Force, Exhaustive Search: Traveling Salesman Problem, Knapsack Problem. Depth-First Search and Breadth-First Search

UNIT-III **Divide and Conquer:** **(06 Hours)**

Merge sort, Quick sort, Binary Tree Traversals and Related Properties, Multiplication of Large Integers and Strassen's Matrix Multiplication,

Multiplication of Large Integers, Strassen's Matrix Multiplication, The Closest-Pair and Convex-Hull Problems by Divide-and-Conquer, The Closest-Pair Problem, Convex-Hull Problem. Heaps and Heap sort.

UNIT-IV **Dynamic Programming and Greedy Techniques:** **(06 Hours)**

The Knapsack Problem and Memory Functions, Optimal Binary Search Trees, Warshall's and Floyd's Algorithms, Greedy Techniques: Prim's Algorithm, Kruskal's Algorithms, Dijkstra's Algorithm, Huffman Trees and Codes.

UNIT-V **Backtracking and Complexity Theory:** **(06 Hours)**

Lower-Bound Arguments, Problem Reduction, Decision Trees, Decision Trees for Sorting, Decision Trees for Searching a Sorted Array, P, NP and NP-Complete, Coping with the Limitations of Algorithm Power, Backtracking: n-Queens Problem, Hamiltonian Circuit Problem, Subset-Sum Problem, Branch-and-Bound, Knapsack Problem, Traveling Salesman Problem.

UNIT-VI **Applications:** **(06 Hours)**

Case Studies of Algorithmic Designs & Applications, Deadlock detection and avoidance implementation. Resource allocation algorithm with deadlock avoidance, Heuristic search algorithm. Recent advances in the subject.

Assignment:

Concerned course faculty can arrange classroom tutorials, MCQ tests and students presentations on each unit. Discuss recent advances in the subject.

Text Books:

1) Anany Levitin. *Introduction to Design and Analysis of Algorithms*. Pearson Education.

2) Horowitz E, Sahni S, Rajasekaran S. *Fundamentals of Computer Algorithms*. University Press.

3) Thomas H. Cormen. *Introduction to Algorithms*. MIT Press.

Reference Books:

1) Jon Kleinberg. *Algorithm Design*. Pearson Education.

2) Gilles Brassard, Paul Bratley. *Fundamentals of Algorithms*. Pearson Education.

3) Donald E. Knuth. *Art of Computer Programming*. Dorling Kindersley Pvt Ltd.

4) Steven S Skiena, *The Algorithm Design Manual*. Springer.

5) Michael T. Goodrich. *Algorithm Design*. Wiley.

Syllabus for Unit Test:

Unit Test -1 **Unit I ,II and III**

Unit Test -2 **Unit IV, V and VI**

Computer Organization and Architecture

Teaching Scheme	Examination Scheme		Credit Allotted	
Theory : 3 Hrs/Week	**End Semester Examination**	**: 60 Marks**	**Theory**	**: 3**
Practicals :2 Hrs/Week	**Continuous assessment**	**: 40 Marks**	**Tw & Pr**	**: 1**
	Term Work and Practical (Tw & Pr)	**: 50 Marks**		

Course Objectives:

1) To study various advanced computer architectures.

2) To study 32-bit/64-bit processor architecture

3) To study latest technology

Course Prerequisites:

Students should have knowledge of

1) Basic Microprocessors and Microcontrollers

Course Outcome:

Students will be able to:

1) Learn 32-bit as well as 64-bit processor architectures.

2) Learn latest computer architectures

3) Learn design of the control unit

4) Learn various latest memory and bus technologies

5) Learn parallel processing concepts

UNIT-I **80386DX Features:** Functional Block Diagram, PIN Description, Register set, Flags, Physical address space, Data types **(06 Hours)**

80386Dx descriptor Tables GDT, LDT, IDT, descriptor cache, Code, data and stack descriptors, system descriptors, privilege levels, Segmentation in 80386DX, comparison of segmentation with 8086, paging, TSS, Nested Tasks, Operating in Real Mode, Protected Mode, Virtual 86 mode, Virtual addressing, 80386DX instruction set, setting protected mode, setting v86 mode, Real mode programming, Memory Management, Protection Mechanism.

UNIT-II **Memory Organizations:** Flash memory, SDRAM, DDR3, DDR4, **(6Hours)**

Advanced DRAMs, Memristors, PRAM (Phase change RAM / PCM – Phase Change Memory) by IBM, Magneto-resistive RAM (MRAM), Resistive RAM (RRAM), Spin Transfer Torque RAM (STT-RAM), Ferro-electric RAM (FRAM), MLC NAND Flash, 3-D NAND, , 3 -D XPoint Technology by Intel and Micron, Intelligent RAM (IRAM) , NUMA and UMA, Memory allocation policies, Cache memory: Concept, architecture (L1, L2, L3), mapping Techniques, Replacement algorithms, Cache coherency, Interleaved and Associative memory. Virtual Memory: Concept, Segmentation and Paging, Page replacement policies.

Secondary Storage: RAID, Blue Ray Disk, Solid State Drives

(SSD),Cloud storage
Bus design considerations, Bus types : PCI, ISA, AGP, SCSI, GPIB, USB, Bus arbitration

UNIT-III **Single Bus Organization, Micro operations and Register Transfers:** **(6Hours)**

Hardwired Control Design methods, Typical Example - Multiplier Control unit, Micro-programmed Control: Basic concepts, Microprogram, Microinstruction sequencing, micro-program sequencing, A complete microprogram, Applications of microprogramming

UNIT-IV **Intel Pentium Processor** **(6Hours)**

Features, Block Diagram, Pin grouping according to function, Modes, Programmer's model, Superscalar Operation, Integer & Floating Point Pipeline Stages, Branch Prediction, Cache Organization, Cache coherence, MESI. Study of features of Pentium Pro, Pentium 2, Pentium 3 and Pentium 4 Processors.

UNIT-V **Advanced Processor Architectures :** **(6Hours)**

Multiprocessor Architectures : Closely coupled and Loosely coupled, UMA, NUMA, COMA, RISC and CISC Architectures, Basics of ARM processor, Superscalar Architecture, SuperSPARC, Nehalem micro-architecture, Intel Haswell micro-architecture Multicore Architecture, Hyper Threading Technology (HTT), Intel 64bit Architecture: Block Diagram, Intel Core i3, i5 and i7 architectures**,** Supercomputer architectures : CDAC PARAM, IBM Blue Gene

UNIT-VI **Introduction to parallel processing systems:** **(6Hours)**

Introduction to parallel processing concepts, Architectural classification of parallel processors, pipeline processing, instruction pipelining, pipeline stages (Intel Pentium pipelining), pipeline hazards, Performance evaluation of pipeline, Data dependency analysis, concurrency analysis, Bernstein's conditions, Message passing libraries like PVM, MPI, CUDA : Parallel Programming Model, Vector processing concepts, NVIDIA GPU Computing

Text Books:

1) C. Hamacher, V. Zvonko, S. Zaky, "Computer Organization", McGraw Hill, 2002, 5th edition.

2) J. Hays, "Computer Architecture and Organization", 2nd Edition, McGraw-Hill, 1988 ISBN 0–07–100479–3

3) 2. Stallings William, "Computer Organization and Architecture: Principles of structure and function", 2nd Ed, Maxwell Macmillan Editions, 1990 ISBN 0 – 02 –946297 – 5.

4) 80386 Microprocessor Handbook, Chris H. Pappas, William H. Murray

5) Pentium Processor System Architecture: Tom Shanley & Don Anderson, Addison-Wesley.
6) Advanced Computer Architecture: Parallelism, Scalability and Programmability-Kai Hwang

Reference Books:

1) B. Govindarajulu, "Computer Architecture and Organization: Design Principles and Applications", Second Edition, Tata McGraw-Hill.
2) Dr. M. Usha, T. S. Srikanth, "Computer System Architecture and Organization",First Edition, Wiley- India.
3) John L. Hennessey and David A. Patterson, "Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.
4) The 80386DX Microprocessor: Hardware, Software and Interfacing: Walter A Triebel, Prentice Hall.

List of Assignments :

1) A program for a) LRU page replacement algorithm.
   b) FIFO page replacement algorithm.
2) A program to simulate the mapping techniques of Cache memory.
   a) Direct Mapped cache
   b) Associative Mapped cache
   c) Set Associative Mapped cache
3) A program to simulate memory allocation policies.
   a) First-fit algorithm
   b)Best-fit algorithm
4) A program to implement serial communication (PC - PC communication).
5) A program to implement parallel communication. (PC - Printer communication).
6) A program for printer simulation.
7) A program for keyboard simulation.
8) Write ALP using to read and display the table content pointed by GDTR/LDTR and IDTR.

Syllabus for Unit Test:

Unit Test -1 Unit I ,II and III
Unit Test -2 Unit IV, V and VI

Elective-II : Multimedia Techniques

Teaching Scheme	Examination Scheme	Credit Allotted
Theory :3 Hrs/Week	End Semester Examination : 60 Marks	Theory: 3
	Continuous assessment : 40 Marks	

Course Objectives:

1) To enable the students to develop synchronization concepts and mechanisms across the whole multimedia system architecture.
2) To study the basic concepts for multimedia transmission at the physical, Medium access control layers presenting the past and existing network technologies

Course Prerequisites:

Students should have knowledge of

1) Student have knowledge of Computer Graphics and GUI Programming
2) Student should have knowledge of Computer programming with C and C++

Course Outcome:

Students will be able to:

1) Understand the concepts of Multimedia architecture, elements, applications and interface standards.
2) Learn the different types of compression techniques and different types of data file Format used in multimedia systems.
3) Understand Different types of audio and video file formats.
4) Develop an interactive multimedia application to display their ability to use multimedia tools including multimedia authoring.
5) Have an insight into how the quality of multimedia systems is perceived and how this relates to the design of multimedia input, output and editing systems.
6) Student will able develop any academic or commercial application.

UNIT-I **Introduction to Multimedia and Graphic Devices:** **(06 hours)**

Types of media, Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Multimedia Elements, Color Schemes, Picture representation, display devices, display adapters.

UNIT-II **Data Compression** **(06 hours)**

Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modelling. Finite Context Modelling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression

ratio loss less & lossy compression

UNIT-III **Audio and Video**

Basic sound concept, Multimedia system sound, MIDI versus digital audio, Audio file formats, National interchange file formats, Digital Audio software's. Types of Video, Video broadcasting standards, Video Quality, Digital Video Software's, Video file formats (for web), Video Compression, Video codec's. **(06 hours)**

UNIT-IV **Image/Graphics and Animation**

Still images, Types of Image, Image Quality, Image Compression, Graphics Software's, Image file formats (for web) Principals of animation, Methods of Animation, Animation Software's, Animation file formats (for web) (JPEG, & MPEG standards). **(06 hours)**

UNIT-V **Multimedia Storage Devices**

Magnetic media, optical media, file systems (traditional, multimedia), Communication devices, Multimedia software's, presentation tools, CD, DVD construction details, recording and reproducing data from CD & DVD. CDROM, COMBO DRIVE, DVD Writer technologies. **(06 hours)**

UNIT-VI **Multimedia Applications:**

Media preparation, communication, entertainment using commercial tools, Interactive television, Video-on-demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors. **(06 hours)**

Assignment List:

1) Explain Types of Multimedia? Multimedia Objects

2) An audio clip has duration of 8 minutes. The highest frequency in the soud wave is 15 kHz. This is to be sampled using 8 bits per sample and in stereo mode. Calculate the file size. Mention any assumptions made?

3) Sound capturing & editing using tools like SOUNDFORGE

4) An MPEG-1 video has a frame sequence: IBBPBBPBBPBBI. Determine the size of GOP. Derive the transmission sequence of the frames?

5) Creating/editing motion video/animation clips (using tools like Flash / Adobe Premier)

6) Consider a TV camera where the maximum intensity of a color signal is represented by 1 volt. An unsaturated magneta signal is formed by mixing 70% R, 20% G and 60% B. What is the luminance output voltage for the signal? What would this value be if the magenta color is saturated?

7) A CD-ROM contains 333000 blocks to be played back in 74 minutes. Calculate the data rate and capacity of the CD-ROM when operating in (a) Mode 1 (b) Mode 2 333000 blocks are played back in 74 minutes?

8) Prepare case study on Educational application Or Industrial application

Text Books:

1) Multimedia – Making it work 5th edition by Tag Vaughan (TMGH)

2) Multimedia Communication – Pearson Education Fred Halsall.

3 Mark Nelson "Data Compression Book" BPB

Reference Books:

1) David Hillman "Multimedia technology and Applications" Galgotia Publications.

2) Rosch "Multimedia Bible" Sams Publishing.

3) Sleinreitz "Multimedia System" Addison Wesley.

4) James E Skuman "Multimedia in Action" Vikas.

5) J. Jeffcoate , Multimedia in Practice: Technology and Application , PHI.

Syllabus for Unit Test:

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV,Vand VI

Elective-II : Embedded System

Teaching Scheme	Examination Scheme		Credit Allotted
Theory :3 Hrs/Week	End Semester Examination	: 60 Marks	Theory :3
	Continuous assessment	: 40 Marks	

Course Objectives:

1) To enable the students to gain a fair knowledge on characteristics and applications of Embedded systems

2)To introduce students to the design issue of embedded system

3)To understanding and experience of state-of-the-practice industrial embedded systems and intelligent embedded system development

Course Prerequisites:

Students should have knowledge of

1)) Students have knowledge about the basic functions of embedded systems Outcomes

2) Digital hardware, introductory electrical circuits concepts, computer architecture, programming & systems programming

Course Outcome:

Students will be able to:

1. Identify the unique characteristics of real-time systems,
2. Explain the general structure of a real-time system,
3. Define the unique design problems and challenges of real-time systems,
4. Apply real-time systems design techniques to various software programs
5. Understand the basics of an embedded system,
6. Program an embedded system,
7. Design, implement and test an embedded system

UNIT-I **INTRODUCTION**:- **(06 Hours)**

Introduction to embedded systems ,Classification, Characteristics and requirements, Embedded Operating system, Design parameters of an embedded system and its significance, design life cycle, tools introduction, hardware and software partitioning and co-design, Concept of Real time Systems, Challenges in Embedded System Design, Design Process Requirements, Specifications, Architecture Design, Designing of Components and System Integration,.

UNIT-II **EMBEDDED SYSTEM ARCHITECTURE**:- **(06 Hours)**

Instruction Set Architecture-CISC architecture [8051] and RISC instruction set architecture [ARM processors], DSP Processors, Coprocessors and Hardware Accelerators, Processor Performance Enhancement Pipelining, Super-scalar Execution, CPU Power Consumption, Memory System Architecture-, Caches, Virtual Memory,

Memory management unit and address Translation.

UNIT-III	**DESIGNING EMBEDDED COMPUTING PLATFORM: -** Designing with Processors System Architecture, Hardware Design, Implementation Development Environment, Debugging Techniques, Manufacturing and Testing. Design Using CPU Bus: Bus Protocols, Bus Organization, I/O Device Interfacing, Interfacing Protocols-GPIB, FIREWIRE, USB, Watchdog Timers.	**(06 Hours)**
UNIT-IV	**OPERATING SYSTEMS:-** Kernel Features: Real-time Kernels, Polled Loops System, Co-routines, Interrupt driven System, Multi-rate System, Processes and Threads, Context Switching, Cooperative Multi-tasking, Pre-emptive Multi-tasking,Scheduling-Rate,Monotonic Scheduling, Earliest-Deadline First Scheduling, Task Assignment, Fault-Tolerant Scheduling. Inter-process Communication-Real-time Memory Management: Stack Management, Dynamic Allocation-Evaluating and Optimizing Operating System Performance-Response.	**(06 Hours)**
UNIT-V	**RTOS**- Tasks, states, Data, Semaphores and shared data, Operating system services, Message queues, Mailboxes. 8. Advanced Processor-(only architectures) 80386, 80486 and ARM (References)	**(06 Hours)**
UNIT-VI	**EMBEDDED CONTROL APPLICATIONS: -** Open-loop and Closed Loop Control Systems-Application Examples-Washing Machine, Automotive Systems, Auto-focusing digital camera, Air-conditioner, Elevator Control System, ATM System.	**(06 Hours)**

Assignment List:

Concerned course faculty can arrange classroom tutorials, MCQ tests and students presentations on each unit. Discuss recent advances in the subject.

Text Books:

1) Raj Kamal, "Embedded Systems", TMH,first edition, 2004

2) David E. Simon, "An Embedded Software Primer", Pearson Education, 1999.

3) Microcontroller (Theory and Applications) Ajay V Deshmukh,Tata McGraw- Hill@2005

Reference Books:

1) Wayne wolf, "Computers as components", Morgan Kaufmann publishers, 2nd Edition, 2008.

2) Ayala. K.J. "The 8051 Microcontroller", Penram International, 1991.

3) Dr. Prasad, "Embedded Real Time System", Wiley Dreamtech, 2004.

4) Jean J.Labrosse, "Embedded system building blocks", CMP books, 2nd Edition, 1999.

5) Arnold berger, "Embedded system design", CMP books, 1st Edition, 2001.

6) Narayan and gong, "Specifications and design of embedded systems", Pearson education, 2nd Edition, 1999.

Syllabus for Unit Test:

Unit Test -1 Unit I ,II and III
Unit Test -2 Unit IV, V and VI

Elective-II : Geographical Information System

Teaching Scheme	Examination Scheme		Credit Allotted
Theory :3Hrs/Week	End Semester Examination	: 60 Marks	Theory :3
	Continuous assessment	: 40 Marks	

Course Objectives:

To understand use of GIS data and systems in various applications that we can use in our life.
To understand use of GIS data and systems to analyze geographical resources and its management

Course Prerequisites:

Students should have knowledge of

1) Basic graphical elements and Maps

2) Basic computer operating skills

Course Outcome:

Students will be able to:

1) Understand Maps and its use in GIS.
2) Understand GIS data Acquisition and Management.
3) Understand GIS data Processing and Visualization.
4) Understand Terrain Mapping, Geocoding.
5) Understand role of Remote Sensing in GIS.
6) Understand GIS Project and Trends .

UNIT-I **Fundamentals of GIS:** **(06 Hours)**

Introduction, Definition of GIS, Evolution of GIS, Roots of GIS , Definition, GIS Architecture, Models of GIS, Framework for GIS, GIS Categories, Map as a Model, Spatial Referencing System, Map Projections, Commonly Used Map Projections, Grid Systems, Cartographic Symbolization, Types of Maps, Typography, Map Design, Map Productions, Map Applications.

UNIT-II **Data Management, Models and Quality Issues:** **(06 Hours)**

Conceptual Models, Geographical Data Models, Data Primitives, Data Types - Raster and Vector Approach, Digital Terrain Modeling , Approaches to digital terrain data modeling , Acquisition of digital terrain data, Data Modeling and Spatial Analysis, Sources of Geographical Data, Data Collectors and Providers, Creating Digital Data Sets, Data Presentation, Data Updating, Data Storage, Spatial Data Costs, Quality of GIS Output, Sources of Errors in Spatial Data,

Factors affecting Reliability of Spatial Data, Faults from Assumptions, spatial autocorrelation, Quadrat counts and Nearest. Neighbour analysis, Trend surface analysis, Gravity models.

UNIT-III **GIS Data Processing, Analysis and Visualization:** **(06 Hours)**

Raster based GIS data processing, Vector based GIS data processing, Human computer interaction and GIS, Visualization of geographic information, principles of cartographic design in GIS, Generation of information product, Image Classification and GIS, Visual Image Interpretation, Types of Pictorial Data Products, Image Interpretation Strategy, Image Interpretation Process, Overview of Image Interpretation Equipments.

UNIT-IV **Terrain Mapping, Geocoding and Segmentation:** **(06 Hours)**

Interpolation, Visualization of Continuous Surfaces, Data Sources for Interpolations, Methods for Interpolations, Global Interpolation, Local Deterministic Methods, Comparison of Global and Local Method,

Optimal Interpolation Using Geo Statistics. Kriging, Variogram, Geocoding, Applications of Geocoding, Dynamic Segmentation, Applications of Dynamic Segmentation.

UNIT-V **Remote Sensing Fundamentals:** **(06 Hours)**

Remote Sensing - Basic Principles, Electromagnetic Remote Sensing, Energy Sources, Energy Interactions with Earth's Surface Materials, Microwave Remote Sensing, The Radar Principle, Factors Affecting Microwave Measurements, Radar Wavebands, SLAR Systems, Sar, Interpreting Sar Images, Geometrical Characteristics, Remote Sensing, Platform and Sensors, Satellite System Parameters, Sensor Parameters, Imaging Sensor Systems, Earth Resources Satellites, Meteorological Satellites.

UNIT-VI **GIS Project Design and Management:** **(06 Hours)**

Software engineering as applied to GIS, GIS project planning, System analysis and study of user requirement, Geographic database design methodology, GIS application software design methodology, system implementation, system maintenance and support.

Issues and Applications in GIS: Changes in Technology, Data Supply and Users, Role of Satellite Imagery and Data Sets, Trends in GIS, GIS users, Urban and Municipal Applications, Other Applications.

Assignment List:

1) Analyze google Maps for geographical area of any city
2) Analyze data from google Maps for any city's geographical structure
3) Study data resource sources for any GIS system
4) Analyze Google Map with Geocoded Address
5) Study various remote sensing application
6) Analyze any GIS Project with tools and techniques used.

Text Books:

1) M. Anji Reddi ," Remote Sensing and Geographical Information Systems" B. S.

Publications, Second Edition
2) George B Korte, .The GIS Book., Onword press, Thomson Learning, 5th Edition, 2003.
3) Ian Heywood, Sarah Cornelius & etal., .An Introduction to Geographical Information Systems., 2nd Edition, Pearson Education

Reference Books:

1) Tor Bernhardsen, .Geographic Information Systems. An Introduction., 3rd edition,Wiley.
2) Peter A Burrough and McDonell, .Principles of Geographical Information Systems, Oxford University Press, 1998
3) M. N. DeMers, .Fundamentals of Geographic Information Systems., 3rd edition, Wiley.

Syllabus for Unit Test:

Unit Test -1 Unit I ,II and III
Unit Test -2 Unit IV, V and VI

Elective – II : Cyber Law and Security Policies

Teaching Scheme	Examination Scheme	Credit Allotted
Theory :3 Hrs/Week	End Semester Examination: 60 Marks	Theory:3
	Continuous assessment : 40 Marks	

Course Objectives: To

1) Understand significance of cyber security and its effect on Individual and society at large.
2) Use of IT ACT 2000 for its possible implementation.

Course Prerequisites:

Students should have knowledge of

1) Working of the Internet
2) Basic security related issues.

Course Outcome:

Students will be able to:

1) Understand security policies
2) Use effective technique to maintain the data.
3) Analyze information using tools and techniques to increase the business.
4) Use huge data available due to social networking site and internet.
5) Apply information analysis for decision making.
6) Apply adequate tool for MIS

UNIT-I **Introduction to Computer Security**: **(06 Hours)**

Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity.

UNIT-II **Secure System Planning and administration:** **(06 Hours)**

Introduction to the orange book, Security policy requirements, accountability, assurance and documentation requirements, Network Security, The Red book and Government network evaluations.

UNIT-III **Information security policies and procedures**: **(06 Hours)**

Corporate policies- Tier 1, Tier 2 and Tier3 policies - process management-planning and preparation-developing policies-asset classification policy-developing standards.

UNIT-IV **Information security:** **(06 Hours)**

fundamentals-Employee responsibilities- information classification-Information handling- Tools of information security- Information processing-secure program administration.

UNIT-V **Organizational and Human Security:** **(06 Hours)**

Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals.

UNIT-VI **Indian IT Act 2000 and 2008:** **(06 Hours)**

Introduction, Definitions in Act, Electronic signature, certifying authority,

Assignment List:

Text Books:

1) Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O' Reilly Media

2) Thomas R. Peltier, "Information Security policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall

3) Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysisand Response Solutions", IGI Global

Reference Books:

1) Thomas R Peltier, Justin Peltier and John blackley, "Information Security Fundamentals", 2nd Edition, Prentice Hall

2) Jonathan Rosenoer, "Cyber law: the Law of the Internet", Springer-verlag

3) Matt Bishop, "Computer Security: Art and Science", Addison-Wesley Professional

4) Joseph M.Kizza, "Computer Network security", Springer

5) Thomas R.Peltier, "Information Security Risk Analysis", CRC Press

Syllabus for Unit Test:

Unit Test -1 **Unit I ,II and III**

Unit Test -2 **Unit IV, V and VI**

IT Lab-IV

Teaching Scheme	Examination Scheme		Credit Allotted
Practical :4	Term Work and Practical (Tw & Pr)	: 50 Marks	Tw & Pr :2

Course Objectives:

1) Describe the basic features of the Linux operating system.
2) Effectively use software development tools including libraries, preprocessors, compilers, linkers, and make files.
3) Discuss correct synchronization techniques for both application programs and kernel code running on uniprocessor as well as multiprocessor (SMM) platforms**.**
4) Use UNIX/Linux utilities to create and manage simple file processing operations, organize directory structures with appropriate security, and develop shell scripts to perform more complex tasks.
5) Apply the UNIX/Linux system to accomplish typical personal, office, technical, and software development tasks.
6) Ability to use Linux environment and write programs.

Course Prerequisites:

Students should have knowledge of

1) Prior exposure to a computer running an operating system such as Apple or Windows.
2) A Unix editor, understands files and directory structures , shell mechanisms.
3) Basic fundamentals of shell programming.

Course Outcome:

Students will be able to:

1) Understand the open source software movement and the advantages and disadvantages of open source software.
2) Acquire knowledge of script programming basics.
3) Acquire a fundamental knowledge of operating system file systems.
4) Use modern operating system calls such as Linux process and synchronization libraries.
5) Understand process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks.

UNIT-I **Introduction :** **(06 Hours)**

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities, sed – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts, operation, patterns, actions, functions, using system commands in awk.

UNIT-II **Working with the Bourne again shell(bash):** **(06 Hours)**

Introduction, shell responsibilities, pipes and input Redirection, output redirection, here documents, running a shell script, the shell

as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

UNIT-III **Files:** **(06 Hours)**

File Concept, File System Structure, Inodes, File Attributes, File types, Library functions, the standard I/O and formatted I/O in C, stream errors, kernel support for files, System calls, file descriptors, low level file access – File structure related system calls(File APIs), file and record locking, file and directory management – Directory file APIs, Symbolic links & hard links.

UNIT-IV **Process :** **(06 Hours)**

– Process concept, Kernel support for process, process attributes, process control - process creation, waiting for a process, process termination, zombie process, orphan process, Process APIs. Signals– Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

Interposes Communication: Introduction to IPC, Pipes, FIFOs, Introduction to three types of IPC-message queues, semaphores and shared memory. Message Queues- Kernel support for messages, Unix system V APIs for messages, client/server example.

UNIT-V **Multithreaded Programming:** **(06 Hours)**

Differences between threads and processes, Thread structure and uses, Threads and Lightweight Processes, POSIX Thread APIs, Creating Threads, Thread Attributes, Thread Synchronization with semaphores and with Mutexes, Example programs**.**

UNIT-VI **Sockets:** **(06 Hours)**

Introduction to Sockets, Socket Addresses, Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs

Assignment List:

1) Installation of Unix/Linux operating system

2) Study of logging/logout details.

3) Study of Unix/Linux general purpose utility command list obtained from (man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown) commands.

4) Write a shell script program to display the process attributes.

5) Write a shell script program to check variable attributes of file and processes.

6) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.

7) Study of Unix/Linux files system (tree structure).

8) Study of .bashrc, /etc/bashrc and Environment variables.

9) Shell script program to copy contents of one file to another.

10) Create directory, write contents on that and Copy to a suitable location in your home directory.

Text Books:

1) Unix System Programming using C++, T.Chan, PHI.(UNIT III to UNIT VIII)

2) Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.

3) Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.

Reference Books:

1) Linux System Programming, Robert Love, O'Reilly, SPD.

2) Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.

3) Unix Network Programming, W.R.Stevens,PHI.

4) Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.