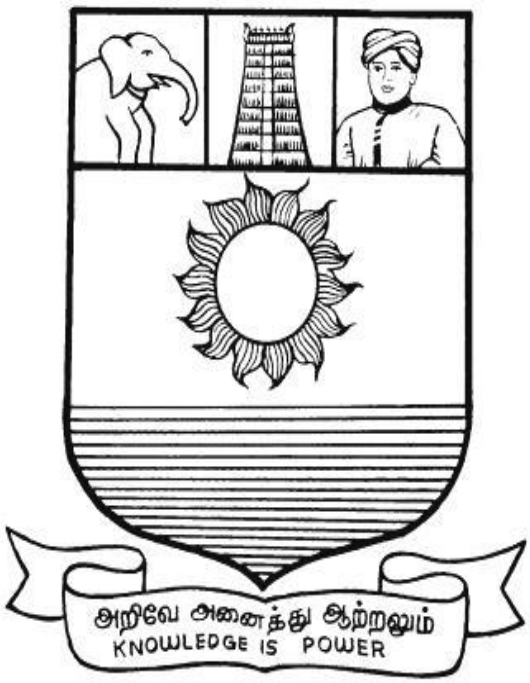
MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI – 12.



BOARD OF STUDIES PG (IT)

(With effect from the academic year 2017-2018 onwards)

Manonmaniam Sundaranar University,

Tirunelveli – 12.

M.SC. INFORMATION TECHNOLOGY

(CBCS - For Colleges)

(2 years – 4 Semesters)

REGULATIONS
(Effective from the academic year 2017-2018 onwards)

1. Eligibility for Admission:

Candidates for admission to the first year of two year M.Sc. Information Technology shall be required to have passed any degree from a recognized University accepted by the Syndicate of this University.

2. Duration of the Course:

The course shall be extended for a period of two academic years consisting of four semesters with two semesters per year.

3. **Passing Requirement:**

The candidate will be declared to have passed in any subject (including practical and project viva voce) of study if he/she secures not less than 50 marks in the University end semesters examinations of their subjects.

4. **Classification of successful candidates:**

A candidate who qualifies for the degree with 60% or more shall be declared to have passed the examination in FIRST CLASS.

A candidate who qualifies for the degree with the 75% or more shall be declared to have passed the examination in FIRST CLASS with DISTINCTION.

All other successful candidates shall be declared to have passed in SECOND CLASS

5. **Procedure in the Event of Failure :**

If a candidate fails in a particular subject (other than project work) he/she may reappear for the University examination in that subject in subsequent semesters and obtain pass mark.

In the event of failure in project work, a candidate shall reregister for project work and redo the project work in the subsequent and resubmit the dissertation a fresh for evaluation.

6. General Conditions :

(a) A candidate will be deemed to have completed the course of any semester only if he/she has secured not less 75% of attendance in the total number of working days of the concerned semester as a whole shall be followed. The usual procedures of condonation and repeat semester in vogue shall be followed for others.

Notes:

1. Each paper carries an internal component.
2. There is a pass minimum of 50% for external and overall components.
3. Theory Paper

   Assessment Components (External:Internal =75:25)
4. Practical Paper

   Assessment Components (External:Internal =50:50)
5. Internal Assessment

   For theory course

Average of the best two test marks from three compulsory Test : 15 Marks.

Assignment	: 5 marks
Seminar	: 5 marks
Total	: 25 marks

For practical course

Experimental Work	: 20 marks
Record	: 15 Marks
Model Test	: 15 Marks
Total	: 50 Marks

Question Pattern – External Exam(Theory) :

Part-A : 10 Multiple choice Questions (One mark each) - 10 x 1 = 10 Marks

(Note: Two Questions per unit)

Part-B : 5 Questions (either – or type) – (5 marks each) - 5 x 5 = 25 Marks
(Note: One Questions per unit)

Part-C : 5 Questions (either – or type) – (8 marks each) - 5 x 8 = 40 Marks
(Note: One Questions per unit)

(b) Choice Based Credit System is followed for all the Courses. When a student completes the required credits prescribed for the course, Overall Percentage of Marks (OPM) will be calculated as follows. The marks obtained by the candidate (sum of external and internal marks) in a paper is multiplied by the credits assigned to the paper. Such weighted marks for all the papers are added and divided by the total credit.

Semester	Title of the Subject	Status	Contact Hrs./ Week	Credits	Maximum Marks			Passing Minimum	
					Internal	External	Total	External	Total
I	**Principles of Information Technology**	**Core-1**	5	4	25	75	100	38	50
	Object Oriented Programming using C++	**Core-2**	5	4	25	75	100	38	50
	Dynamic Web Programming	**Core-3**	4	4	25	75	100	38	50
	E-commerce	**Core-4**	4	4	25	75	100	38	50
	Data Communication and Networks	**Core-5**	4	4	25	75	100	38	50
	C++ Lab	**Core Practical-1**	4	2	50	50	100	25	50
	Web Programming Lab	**Core Practical-2**	4	2	50	50	100	25	50
	Sub total	**7 courses**	**30**	**24**					

Semester	Title of the Subject	Status	Contact Hrs./ Week	Credits	Maximum Marks			Passing Minimum	
					Internal	External	Total	External	Total
II	**Computer Architecture**	**Core-6**	5	4	25	75	100	38	50
	Advanced Java Programming	**Core-7**	5	4	25	75	100	38	50
	Mobile Computing	**Core-8**	4	4	25	75	100	38	50
	Embedded Systems	**Core-9**	4	4	25	75	100	38	50
	Elective-1 (select any one from Elective –I group)	**Elective-1**	4	3	25	75	100	38	50
	Java Programming Lab	**Core Practical-3**	4	2	50	50	100	25	50
	Mobile Computing Lab	**Core Practical-4**	4	2	50	50	100	25	50
	Sub total	**7 courses**	**30**	**23**					

Semester	Title of the Subject	Status	Contact Hrs./ Week	Credits	Maximum Marks			Passing Minimum	
					Internal	External	Total	External	Total
III	**Software Engineering**	**Core-10**	4	4	25	75	100	38	50
	Advanced Operating System	**Core-11**	4	4	25	75	100	38	50
	Advanced Database System	**Core-12**	4	4	25	75	100	38	50
	Big Data Analytics	**Core-13**	4	4	25	75	100	38	50
	Research Methodology	**Core-14**	4	4	25	75	100	38	50
	Elective-2 (select any one from Elective – II group)	**Elective -2**	4	3	25	75	100	38	50
	DBMS – Lab	**Core Practical-5**	4	2	50	50	100	25	50
	Mini Project Lab	**Core Project-1**	2+2*	2	50	50	100	25	50
	Subtotal	**8 courses**	**30**	**27**					

Semester	Title of the Subject	Status	Contact Hrs./ Week	Credits	Maximum Marks			Passing Minimum	
					Internal	External	Total	External	Total
IV	**Main Project Lab**	**Core** **Project-2**	**30+2***	**16**	**50**	**50**	**100**	**25**	**50**
	Subtotal	**1 course**	**30**	**16**					
Total		**14T+5P+2Proj+ 2Elect.**	**120**	**90**					

*Extra hours for Project

For the Project, **f**lexible credits are b/w 5 – 8 & Hours per week are b/w 10 - 16.

Total number of credits ≥ 90 : 90
Total number of Core Courses : 21 (14 T + 5 P + 2 Prj.)
Total number of Elective Courses : 2
Total hours : 120

List of Electives offered:

Elective – I Group

(A) Artificial Intelligence
(B) Data mining and Warehousing
(C) Shell programming with Open Source s/w

Elective – II Group

(A) .NET Programming
(B) Image Processing
(C) Cloud Computing

SEM. I CORE PAPER-1 : PRINCIPLES OF INFORMATION TECHNOLOGY

Unit I : Introduction to Computer system

Introduction to computers– Generations of modern computers – Classification of digital computer systems – Anatomy of a digital computer – computer software – Hardware/software interaction – Classification of software – Operating systems (functions & classification of Os) – Introduction to Database Management system (DBMS – benefits – functions – DB users). **(12L)**

Unit II : Telecommunications

Introduction to Telecommunications: Analog and Digital Signals - Modulations - Types of modulations - Pulse modulation techniques – digital modulation – modems

Computer Networks: Overview of networks - Communication processors - Communication media - Telecommunication Software – Types of network – network topology.

Communication System : Radio- TV – Microwave systems – Communication satellites – Radar – Fiber optics – ISDN – ADSL – T1 & T3 line connection. (**14L**)

Unit III: **Multimedia and Virtual Reality**

Introduction to Multimedia – **Multimedia Applications**:- Multimedia in education and training – Multimedia in entertainment – multimedia in marketing – **Introduction to Virtual reality**: History of VR – present uses of VR – Future of VR. (**12L**)

Unit IV: **New Technologies in Information Technologies**

Introduction to Hypermedia – Artificial Intelligence & Business Intelligence – Knowledge Discovery in Databases (KDD) – Data mining and On_Line Analytical Processing (OLAP)- Geographical Information System(GIS) (**12L**)

Unit V: **Applications of Information Technology**

Computers in business and Industry – Computers at Home – Computers in education and training- Computers in Entertainment Science, Media & Engineering- Mobile computing. (**10L**)

Reference Books:

1. Fundamental of Information Technology (second edition), Alexis Leon and Mathew Leon- Leon Vikas publication.

2. Information Technology – Dennis P.Curtin, Kim Foley, Kunalson, TATA McGRAW – Hill edition.

SEM-I CORE PAPER-2: OBJECT ORIENTED PROGRAMMING USING C++

Unit-I

Introduction:

Why do we need OOP?- Characteristics of Object Oriented Language- C++ and C-UML **C++ programming basics**: Basic program construction-output using cout-Directives-comments-Integer variable-Character variable-input with cin-Floating point types-Type bool-setw-type conversion-Arithmetic operators -Library function-Relational operators-loops-Decisions-Logical operators-Other Control Statements. (**12L**)

Unit-II

Structures: Structure-Enumeration **Functions**: Simple Functions-Passing arguments to functions-Returning values from Functions-Reference arguments –Overloaded functions-Recursion-Inline function-Default arguments-Scope and Storage class-Returning by Reference (**10L**)

Unit-III

Objects and classes: A simple class C++ objects as physical objects-C++ objects as data Types-Constructors-Objects as function Arguments –Copy constructor-Returning objects from Function-Structures and Classes-Classes , Objects and Memory-Static Class data-const and classes. **Arrays and Strings**: Array Fundamentals- Array as Class member Data-Arrays of objects-C-strings – The Standard C++ String class. (**13L**)

Unit-IV

Inheritance : Derived and Base Class – Derived Class Constructor –Overriding- Class Hierarchies- Public and Private **Inheritance**- Levels of Inheritance – Multiple Inheritance **Pointers:** Addresses and pointers- The Address of Operator – Pointer and Arrays- Pointers and Functions. (**13L**)

Unit-V

Virtual function: Virtual, Friend, Static function-this pointer Stream and Files: Stream classes-Disk file I/O Streams-file pointers –Error handling-Command line Arguments. Templates and Exceptions: Function Template- Class Template-Exceptions. (**12L**)

REFERENCE BOOKS:

1. Object Oriented Programming in C++, Robert Lafore , Fourth Edition-Pearson Education
2. Ashok N.Kamathane ,"Object Oriented Programming with ANSI and Turbo C++", pearson Education.
3. E. Balagurusamy, "Object Oriented Programming with C++", Fourth Edition -TMH Publication.

SEM-I CORE PAPER-3 DYNAMIC WEB PROGRAMMING

Unit-1 **Web programming Basics and Installations**

Web Publishing: A Quick look-HTML 4.0: the web Publishing Foundation- HTML basics-Putting your Server to work-Server side programming- XML Basics. (**10L**)

Unit-II. **Installation and Configuration**

Getting up and running: Installation Quick Start Guide- Installing and configuring MySql- Installing and configuring Apache-Installing and configuring PHP. (**10L**)

Unit-III. **PHP Language Structure**

The Building blocks of PHP- Flow Control Functions in PHP- Working with Functions- Working with Arrays- Working with Objects- Working with Strings, Dates and Time- Working with Forms- Working with Cookies and User Sessions- Working with Files and Directories Working with Images. (**14L**)

Unit-IV. **PHP and MySQL Integration**

Understanding the Database Design- Process Learning Basic SQL Commands Using Transactions and Stored Procedures in MySQL- Interacting with MySQL Using PHP. (**13L**)

Unit-V. **Basic Projects**

Managing a Simple Mailing List- Creating an Online Address Book- Creating a Simple Discussion Forum- Creating an Online Storefront and shopping Cart Mechanism- Creating a Simple Calendar- Restricting Access to Your Applications- Logging and Monitoring Web Server Activity- Application Localization- Working with XML- Connecting to Web Services Apache Performance Tuning and Virtual Hosting- Setting Up a Secure Web Server- Optimizing and Tuning MySQL. (**13L**)

REFERENCE BOOKS:

1. Sam Teach Yourself PHP, MySQL and Apache All in One, 5th Edition, Julie Meloni

2. Dynamic Web Publishing, Second Edition, Shelley Powers, Techmedia

3. Steve Suehring, Tim Converse and Joyce Park, ”PHP 6 and MySQL 6 Bible”, Wiley India reprint, 2009.

4. Robert Sheldon, Geoff Moes, ”Beggining MySQL”, Wrox, 2005.

5. BEN FORTA, ”MySQL Crash course “SAMS, 2006.

SEM-I CORE PAPER-4 E-COMMERCE

Unit - I

Introduction to E-Commerce: Benefits-Impacts-Classification and Application of E-Commerce Business Model-Architectural Frame Work. (**10L**)

Unit – II

Network Infrastructure: Local Area Network-Ethernet-Wide Area Network-Internet-TCP/IP Reference Model-Domain Name System-Internet Industry structure-Information Distribution and Messaging: FTP Application-Electronic Mail-World Wide Web Server-HTTP-Web Server Implementations. (**12L**)

Unit – III

Information Publishing Technology: Information publishing-Web Browsers-HTML-CGI Multimedia Content - Other Multimedia Objects-VRML- Securing the Business on Internet Why Information on Internet is vulnerable?-Security Policy-Procedures and Practices-Site Security-Protecting the Network-Firewalls-Securing the Web Service. (**13L**)

Unit – IV

Securing Network Transaction-Electronic Payment Systems: Introduction –Online Payment Systems-Pre-paid Electronic Payment System- Post-paid Electronic Payment System Requirement Metrics of a Payment System (**12L**)

Unit – V

Search Engines and Directory Services: Information Directories –Search Engines –Internet Adverting- Agents in Electronic Commerce: Needs and Types of Agents-Agent Technologies Agents Standards and Protocols-Agents Applications-Case Study. (**13L**)

Reference Books:

1. Bharat Bhasker, "Electronic Commerce Framework, Technologies and Applications", Tata McGraw Hill Publication, 2003.

SEM-I CORE PAPER-5 DATA COMMUNICATION AND NETWORKS

Unit-I

Introduction- Data Communications-Networks-Internet-Protocols and Standards – Network models-OSI model-Layers in the OSI model-TCL/IP protocol suite – Addressing –Analog and Digital-Digital signals-digital Transmission-Analog Transmission. (**12L**)

Unit-II

Multiplexing-Transmission media-Guided media-Unguided media- Switching-Circuit switched networks-Datagram Networks-Virtual Circuit Networks-Structure of Switches-Telephone network-Dial-up modems-Cable-TV Networks. (**12L**)

Unit-III

Wired LANs: Ethernet-IEEE standards – Standard Ethernet-Changes in the Standards-Fast Ethernet- Gigabyte Ethernet-Wireless LANS-IEEE 802.11-Bluetooth-wireless WANS: cellular Telephony-Satellite Networks-SONET/SDH. (**13L**)

Unit-IV

Virtual-Circuit Networks: Frame relay and ATM-Frame relay -ATM-ATM LANS-Network layer:Logical addressing-IPV4 and its Addressing-IPV6 and its Addressing-Network layer: Internet protocol-Inter-networking-Transition from IPV4 to IPV6. (**13L**)

Unit-V

UDP- Domain Name system-FTP-TELNET-HTTP-SNMP –Voice over IP-Network Security-Security services-Digital signature-IP Security-Firewalls-UNICODE Encoding. (**10L**)

REFERENCE BOOKS:

1. Data communications and Networking, BEHROUZ A FOROUZAN, Fourth Edition, Tata-McGraw-Hill publication, 2006.
2. Computer Networks: Protocol, Standards and Interfaces-Black Prentice Hall of India.
3. Data and computer communication- William Stallings, Prentice Hall of India, Fourth Edition.

C++ Lab

1. Classes and Objects
2. Function Overloading
3. Constructors
4. Friend function
5. Inline Function
6. Operating Overloading
7. Conversion function
8. Inheritance
9. Method Overriding
10. Virtual Functions
11. Virtual Base Class
12. Files
13. Function Templates
14. Class Templates

Web Programming Lab

1. String manipulation
2. Math operations
3. Array functions and operations
4. Looping structures utilization
5. Page hit counter

6. Input/output operations
7. Reading/writing files and Directories
8. Events Calendar application using PHP
9. MySQL Connectivity and Database manipulations
10. Session maintenance in PHP.

SEM. II CORE PAPER-1 : COMPUTER ARCHITECTURE

UNIT-I:

Instruction Codes – Computer Register – Computer Instruction- Instruction Cycle- Functional unit- Basic operational concepts – Bus Structure – Software- software- performance Historical perspective. (**10L**)

UNIT-II: **Memory:** Memory Location, Addresses, Memory operation- Instructions and Instruction Sequencing-Addressing Modes. I/O Devices : Addressing I/O Devices- Interrupts- Processor Example- Direct memory access- Standard I/O Interfaces. (**13L**)

UNIT-III:

Memory Systems: Some basic concepts - Semiconductor RAM memories – Read only memories speed, size and cost- cache memories- performance considerations-virtual memories – memory management requirements. (**14L**)

UNIT-IV:

Parallel processing: Trends towards parallel processing- Parallelism in uniprocessor sytems- parallel Computer structures- Architectural Classification Schemes- Parallel Processing Applications. (**12L**)

UNIT-V:

Multiprocessor Architecture: Functional Structures- Interconnection Networks- Multiprocessor Operating Systems- Inter process Communication Mechanisms- System Deadlocks and Protection- Multiprocessor Scheduling Strategies. (**11L**)

REFERENCE BOOKS:

1. Computer System Architecture by M. Morris Mano, Prentice Hall Eastern Economy Edition. (Chapter 5)

2. Computer Organization by Carl Hamacher, Zvonko Vranesic, Safwat Zaky, McGraw Hill International Edition.(Chapter 1,2,4,5)

3. Computer Architecture and parallel processing by KAI Hwang, Faye A. Briggs, McGRAW-Hill International Edition. (Chapter 1,7,8)

SEM. II CORE PAPER-2 : ADVANCED JAVA PROGRAMMING

UNIT-I:

Introducing Java-The Evolution of Java-The logical evolution of C to C++ and Java-Object oriented programming concepts and java programming with java. Getting started with Java Developer's kit(JDK)- The Java developer's environment. The Java browser and the world wide web –Navigating the world wide web –using URL's- web surfing with Java enchanced browsers –Web-Hot spots for Java developers-Java tools-Java language. (**12L**)

UNIT-II:

Fundamentals of Java language-Token-Using data types-Expressions-Declarations-control flow-Building objects-An introduction to classes- working with objects-packages-Inheritance-Interfaces-threads-exceptions-streams. (**12L**)

UNIT-III:

Java API packages, The structure of API Packages. Using the Java API, API web reference Structure. The Java Applet class, Java language- packages and its classes. The AWT class library-Introduction to the AWT-Using the frame class to implement application windows-Implementing dialog boxes with dialog class –organizing the components using the panel and layout classes-using common GUI controls-using Fonts - image related classes-using scroll bars. The java I/O and utility class libraries. The Net and debug class libraries (**13L**)

UNIT-IV:

Defining the applet structure- building the applet- The Java extensions to HTML – Adding animation to web documents. The reducing animation flickers- Publishing a Java- presentation on the web. Applets reuse-adding functionality to existing applets –when to reuse –when to rewrite-extending an applet-Testing the extended applet.

JDBC: Java Database Connectivity, Types of JDBC drivers, Writing JDBC applications, Types of Statement objects, Types of resultset, Inserting an updating records, using transactions. (**13L**)

UNIT-V:

Java Servlets: Java Servlets and CGI Programming –A Simple Java Servlet –Anatomy of a Java Servlet Reading Data from a Client –Sending Data to a Client – Working with Cookies Java Server Pages: JSP-JSP tags-Tomcat-Request String –User sessions-Cookies-Session Object. (**10L**)

REFERENCE BOOKS

1. Peter Norton And William Stanek –Peter Norton's Guide to Java Programming-Techmedia-1997

2. Alan.R.Willamson and Ceri L.Moran-Java Database Programming –Prentice Hall 1997.

3. C.Muthu, Programming with Java, 2nd Edition ,VNI

4. Joseph O'Neil, Java Beans Programming, TMH

SEM. II CORE PAPER-3 : MOBILE COMPUTING

UNIT-I:

Introduction: Wireless transmission, Frequencies for radio transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulations, Spread spectrum, MAC, SDMA, FDMA, TDMA, CDMA, Cellular Wireless Network. (**14L**)

UNIT-II:

Telecommunication systems: GSM, GPRS, DECT, UMTS, IMT-2000, Satellite Networks, Basics, Parameters and Configurations, Capacity Allocation, FAMA and DAMA, Broadcast Systems, DAB, DVB. (**12L**)

UNIT-III:

Wireless LAN: IEEE 802.11, Architecture, Services, MAC, Physical layer, IEEE802.11a-802.11b standards, HIPERLAN, BlueTooth. (**14L**)

UNIT-IV:

Mobile IP, Dynamic Host Configuration Protocol, Routing, DSDV, DSR, Alternative Metrics (**10L**)

UNIT-V:

Traditional TCP, Classical TCP improvements, WAP, WAP 2.0, WML Basics, WML Cards. (**10L**)

REFERENCE BOOKS

1. Jochen Schiller, "Mobile Communications", 2/e, PHI/Pearson Education, 2003.

2. William Stallings, "Wireless Communication and Networks", PHI/Pearson Education, 2002

3.Kaveh Pahlaven, Prasanth Krishnamoorthy, "Principles of Wireless Networks", PHI/Pearson Education, 2003.

4. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stobar, "Principles of Mobile Computing", Springer, New York, 2003

5. Hazysztof Wesolowshi, "Mobile Communication Systems", John Wiley and Sons Ltd, 2002.

SEM. II CORE PAPER-4 : EMBEDDED SYSTEMS

Unit - I

Hardware Fundamentals Hardware Fundamentals: Terminology-Gates-Timing Diagrams Memory Advanced Hardware Fundamentals: Microprocessors-Microprocessor architecture Direct Memory Access-Conventions and Schematics-Introduction to embedded systems: An embedded system-Processor in the system-Exemplary embedded systems. (**15L**)

Unit – II

Interrupts and Software Architecture Interrupts: Interrupt basics-Interrupt service routines Survey of Software Architectures: Round Robin with interrupts-Function-Queue-Scheduling Architecture-Real Time Operating Systems Architecture Introduction to Real Time Operating Systems: Selecting in RTOS-Tasks and Task States-Tasks and Data-Semaphores and shared Data. (**12L**)

Unit – III

Concepts of RTOS More Operating System Services: Interrupt process communication-Message queues- Mailboxes and pipes-Timer functions-Events-Memory management-interrupt routines in an RTOS environment Basic design using a Real Time Operating System: Principles encapsulating semaphores and queues-hard real time scheduling considerations-saving memory space and power-introduction to RTL & QNX. (**13L**)

Unit – IV

Embedded software life cycle and tools Embedded software Life cycle : Software Algorithm complexity-Software development process life cycle and its models Software development tools: development tools-hosts and target machine-linker/locators for embedded software-getting embedded software into the target machine Debugging techniques: testing on your host machine-instruction set simulators-the asset macro-using laboratory tools. (**15L**)

Unit – V

Case Study (**5L**)

Reference Books:

1. David.E.Simon, “An embedded system primer”, Addison Wesley-2001
2. 2. Raj Kamal, “Embedded Systems architecture, programming and design”, Tata McGraw Hill Publishing Company Ltd., New Delhi 2003.

Elective – I Group: (A) ARTIFICIAL INTELLIGENCE

UNIT-I

What is artificial intelligence: The AI problems-The underlying assumption- what is an AI technique-The level of the model-criteria for success.

Problems, problem spaces and search: Defining the problem as a state space search –Production of systems-problem characteristics-production system characteristics-Issues in design of search programs. (**10L**)

UNIT-II

Heuristic Search Techniques: Generate and Test-Hill Climbing –Best First Search-Problem Reduction –Constraint satisfaction-Means-End analysis.

Knowledge Representation Issues: Representation and Mappings-Approaches to Knowledge Representation –Issues in Knowledge Representations. (**13L**)

UNIT-III

Using Predicate Logic: Representing simple facts in Logic-Representing Instance and Isa relationships-Computable Functions and Predicates.

Representing Knowledge using Rules: Procedural versus Declarative Knowledge-Logic Programming-Forward verses backward reasoning-control knowledge. (**12L**)

UNIT-IV

Symbolic Reasoning under Uncertainty: Introduction to non-monotonic reasoning-Logics for non-monotonic reasoning- Implementation Issues –Implementation Issues-Implementation of Dept First Search, Breadth First Search. (**13L**)

UNIT-V

Weak slot and Filler Structures-Strong slot and Filler Structures-Game Playing-understanding Parallel and Distributed AI-Connection Models-Expert Systems –Perceptions and Action. (**12L**)

REFERENCE BOOKS:

1. Artificial Intelligence-Third Edition by Elaine Rich, Kevin Knight, Shivasankar B Nair, 2009.

2. Artificial Intelligence-First Edition By Neeta Deshpande , Nanda Yadav, 2008.

Elective – I Group: (B) DATA MINING AND WAREHOUSING

UNIT- I

Introduction : Data mining application – data mining techniques - data mining case studies – the future of data mining - data mining software – Association rules mining : Introduction – basics- task and a naive algorithm- apriori algorithm- improve the efficiency of the apriori algorithm- mining frequent pattern without candidate generation. (**10L**)

UNIT-II

Classification: Introduction – decision tree – over fitting and pruning – DT rules estimation predictive accuracy of classification methods – other evaluation criteria for classification method – classification software. (**11L**)

UNIT- III

Cluster Analysis: cluster analysis - types of data - computing distances- types of cluster analysis methods - partitioned methods- hierarchical methods – density based methods – dealing with large databases- quality and validity of cluster analysis methods – cluster analysis software. (**14L**)

UNIT- IV

Web Mining: Introduction -Web Terminology and Characteristics – Locality and Hierarchy in the Web – Web content Mining – Web Usage Mining- Web structure Mining – Web mining Software - **Search Engines**: Search Engines Functionality – Search Engines Architecture – Ranking of Web Pages (**10L**)

UNIT- V

Data warehousing: Introduction – Operational data sources - data warehousing - data warehousing design- Guidelines for data warehousing implementation - data warehousing metadata - Online analytical processing(OLAP): Introduction - OLAP - characteristics of OLAP system – Multidimensional view and data cube – Data cube implementation – Data cube operations - Data cube implementation guidelines. (**15L**)

REFERENCE BOOKS

1. "Introduction to Data mining with case studies", G.K. Gupta, PHI Private Limited, New Delhi, 2008.
2. Margaret H. Dunham, "Data mining introductory and advanced topics", Pearson education, 2003.
3. C.S.R. Prabhu, "Data warehousing concepts, techniques, products and a applications", PHI, Second Edition.

Elective – I Group: (C) Shell programming with Open Source s/w

Unit I Introduction: Open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, History : BSD, The Free Software Foundation and the GNU Project, Philosophy: Software Freedom, Open Source Development Model, Licenses and Patents, Economics of FOSS - Zero Marginal Cost, Income-generation opportunities, Problems with traditional commercial software, Internationalization. (**12L**)

Unit II Open Source Platform and Technologies: The Open Source Platform – Operating Systems, Windowing Systems and Desktops, GIMP, Technologies Underlying Open source Development. (**10L**)

Unit III Linux Application: Accessing and Running Applications-Multimedia in Linux : Listening to Audio, Playing video, Using Digital Camera, Recording music / video CDs. Publishing: Open office, Working with Graphics, Printing Documents, Displaying documents with Ghost script and Acrobat, Using Scanners driven by SANE. (**13L**)

Unit IV Shell programming – vi editor – Shell syntax - variables – conditions and control structures- command execution – simple programs – System calls and library: Read – Write – File and record locking – Adjusting the position of file I/O – Lseek - Close – File creation – Creation of special files – Changing directory, root, owner, mode – stat and fstat. (**13L**)

Unit V Processes: Introduction of process – Process states - Process termination – command line arguments - Process control – Process identifiers - Process relationships - Signals - Threads.
Inter process Communication – Introduction - Pipes - FIFO – Message queues – Semaphores - Shared Memory. (**12L**)

REFERENCE BOOKS

1. Christopher Negus, Red Hat Linux Bible, Wiley Publishing, ISBN: 0-7645-4333-4.
2. Fadi P. Deek, James A. M. McHugh, Open Source Technology and Policy, Cambridge University Press, 2008.
3. Neil Matthew, Richard Stones, Beginning Linux Programming, Third Edition, Wrox, Wiley Publishing Inc., 2004.

SEM. III CORE PAPER-1 SOFTWARE ENGINEERING

Unit I

Introductions: Evolving role of software – Software characteristics, components and its applications – Generic view of software engineering – Software process models. (**10L**)

Unit II

Systems Analysis: Requirements analysis – Analysis principles – Prototyping Software requirement specification – Data modeling, functional modeling and behavioral modeling. (**12L**)

Unit III

Design concepts: Design and software quality, Design concepts : Abstraction, refinement, modularity, and software architecture control hierarchy structural partitioning and information hiding, Effective modular design: functional independence, cohesion and coupling – design documentation. (**14L**)

Unit IV

Design Methods: Data design – Architectural design process: transform mapping and transaction mapping – interface design – procedural design. Design for Real – Time Systems : System considerations – real time systems – analysis and simulation of real time systems. (**12L**)

Unit V

Software Testing Methods : Software testing fundamentals. White box testing: basis path testing and control structure testing – black box testing – testing for specialized environments. Software Testing Strategies: A strategic approach to software testing – unit testing – integration testing – validation testing – system testing. (**12L**)

REFERENCE BOOKS

1. R.S.Pressman ”Software Engineering”, (5th edition) Tata McGraw Hill, 1997.
2. Software Engineering Principles And Practices, Second Edition, Rohit Khurana ITL ESL
3. Software Engineering Principles And Practice, Waman S Jawadekar, Tata McGraw-Hill

SEM. III CORE PAPER-2 ADVANCED OPERATING SYSTEM

Unit – I

Introduction : What is an Operating System? – Main frame Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments. Computer System Structures : Computer-System Operation - I/O Structure - Storage Structure - Storage Hierarchy - Hardware Protection - Network Structure. Operating System Structures: System Components – Operating System Services - System Cal ls - System Programs - System Structure - Virtual Machines - System Design and Implementation - System Generation. (**12L**)

Unit – II

Process Management : Process Concept - Process Scheduling - Operations on Processes – Cooperating Processes – Inter Process Communication – Communication in Client-Server Systems. CPU Scheduling : Scheduling Concepts Scheduling Criteria - Scheduling Algorithms - Algorithm Evaluation – Multiple-Processor Scheduling – Real-Time Scheduling. Process Synchronization: The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic Problems of Synchronization – Critical Region – Monitors. Deadlocks: Deadlock Problem – Deadlock Characterization – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection - Recovery from Deadlock. (**14L**)

Unit – III

Memory Management: Background – Swapping - Contiguous Memory Allocation - Paging – Segmentation - Segmentation with Paging. Virtual Memory: Demand Paging - Page Replacement – Allocation of Frames - Thrashing. File System Interface: File Concept - Access Methods - Directory Structure - File System Mounting - File Sharing - Protection. File System Implementation: File-System Structure - File-System Implementation - Directory Implementation - Allocation Methods - Free-Space Management - Recovery. (**14L**)

Unit – IV

I/O systems: I/O Hardware - Kernel I/O Subsystem. Mass-Storage Structure : Disk Structure - Disk Scheduling - disk management - swap-space Management, RAID structure, disk attachment, stable-storage implementation, tertiary-storage structure. (**12L**)

Unit – V

Comparative study - DOS, UNIX/LINUX, Windows 9x, Windows NT. (**8L**)

REFERENCE BOOKS:

1. Silberschatz, Galvin, Gagne, "Operating Systems Concepts", John Wiley & Sons, Inc., Sixth Edition.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Pr entice Hall of India, Second Edition.
3. H. M. Deitel, "Operating Systems", Pearson Education, Second Edition.

SEM. III CORE PAPER-3 : ADVANCED DATABASE MANAGEMENT SYSTEMS

Unit – I

Introduction to Database Management Systems : Introduction, Characteristics of Data – Database Management System – Types of Database Management Systems –Introduction to Relational Database Management Systems: The relational Data Structure – Relational Data Integrity – Relational Data Manipulation- Codd's Rules. (**10L**)

Unit – II

E-R modeling : Introduction-Components of E-R Model – E-R Modeling Symbols - Data Normalization : Introduction - first to fifth normal form –DKNF - Denormalization – Relational Algebra and Relational Calculus : Relational Algebra – Relational Calculus. (**14L**)

Unit – III

Introduction to SQL : Introduction- History of SQL – Characteristics of SQL – Advantages of SQL – SQL Data types and Literals – Types of SQL Commands – SQL Operators – Operator Precedence – Tables ,Views and Indexes : Creation , Modification and deletion of table, View and Indexes. (**10L**)

Unit – IV

Queries and Sub queries : Queries : Qualified Retrieval – Eliminating Duplicates – Select using In, Between and Like - Escape Clause – Selecting Computed Values – Grouping – Ordering - Sub-queries : Execution of Subquery – Nested Subquery – Parallel Subquery – Correlated Subquery – Aggregate Functions: General Rules – COUNT, SUM, AVG, MAX and MIN – Insert, Update and Delete Operations – Single row and Bulk Insert -Update –Delete. (**12L**)

Unit – V

Cursors : Cursor Operations – Cursor Positions : Cursor Definition ,Opening the cursor– Fetch, Update, Delete and Closing the Cursor – Joins and Unions : Aliases – Qualities of a Good Join –

Equijoin , Non Equijoin and Theta Joins – Natural Join, Self Join – Joining more than 2 Tables – Joins Vs Subqueries –Outer Join- Unions –Triggers- Types of Triggers –Replace, Dropping Triggers – Advantages and Limitations of Triggers. (**14L**)

REFERENCE BOOKS:

1. Database System Concepts- Avi Silberschatz, Henry F. Korth , S. Sudarshan, McGraw-Hill *Sixth Edition.*
2. Database Systems Using Oracle – Nilesh Shah
3. Database Management Systems – Alexis Leon , Mathews Leon

SEM. III CORE PAPER-4 : BIG DATA ANALYTICS

Unit I

A new paradigm for big data: Scaling with a traditional database – Desired properties of a Big Data System-The problems with fully incremental architectures-Lambda Architecture-Recent Trends in Technology.

Batch Layer: DATA model for Big DATA - The properties of data- the fact-based model for representing data- Graph schemas. **Data Model for Big Data:** Why serialization framework? - Apache thrift – Limitations of serialization frameworks. (**13L**)

Unit II

Data Storage on the batch layer: Storage requirements for the master dataset – Choosing a storage solution for the batch layer – How distributed filesystems work – Storing a master dataset with distributed filesystem – Vertical partitioning – Low-level nature of distributed filesystems – Storing the SuperWebAnalytics.com master dataset on a distributed file system. (**13L**)

Unit III

Data storage on the batch layer: Illustration: Using the Hadoop Distributed File System – Data storage in the batch layer with Pail – Storing the master dataset for SuperWebAnalytics.com.

Batch layer: Motivating examples – Computing on the batch layer – Recomputation algorithms vs. incremental algorithms –Scalability in the batch layer – MapReduce: a paradigm for Big Data computing – Low-level nature of MapReduce-Pipe diagrams: a higher-level way of thinking about batch computation

Batch layer: Illustration: An illustrative example- Common pitfalls of data-processing tools – An introduction to JCascalog – Composition.

An example batch layer: Architecture and algorithms: Design of the SuperWebAnalytics.com batch layer – Workflow overview – Ingesting new data – URL

normalization – User-identifier normalization – Duplicate pageviews – Computing batch views. (**10L**)

Unit IV:

Serving layer: Performance metrics for the serving layer- The serving layer solution to the normalization/denormalization problem- Requirements for a serving layer database- Designing a serving layer for Super WebAnalytics.com – Contrasting with a fully incremental solution.

Serving layer: Illustration: Basics of ElephantDB – Building the serving layer for SuperWebAnalytics.com (**12L**)

Unit V

Speed Layer: Realtime views: Computing realtime views – Storing realtime views – Challenges of incremental computation – Asynchronous versus Synchronous updates – Expiring realtime views.

Realtime views: Illustration: Cassandra's data model – Using Cassandra.

Queuing and stream processing: Queuing – Steam processing – Higher-level, one-at-a-time stream processing – SuperWebAnalytics.com speed layer.

Queuing and stream processing: Illustration: Defining topologies with Apache Storm – Apache Storm clusters and deployment –Guaranteeing message processing – Implementing the SuperWebAnalytics.com unique-over-time speed layer.

Lambda Architecture in depth: Defining data systems – batch and serving layers – Speed layer – Query layer.

Case Studies: An example of Batch Layer implementation. (**12L**)

REFERENCE BOOKS:

1. "Big Data Principles and best practices of scalable real-time data systems", Nathan Marz, James Warren, Manning publications co., Edition 2016, published in India by Dreamtech Press, 19-A, Ansari Road, Daryaganj, New Delhi.

2. Big Data: A Revolution That Will Transform How We Live, Work, and Think by Viktor Mayer-Schönberger, Kenneth Cukier Published March 5th 2013 by Houghton Mifflin Harcourt.

SEM. III CORE PAPER-5 : RESEARCH METHODOLOGY

UNIT I

Research Methodology: An Introduction - Meaning of Research - Objectives of Research - Types of Research, Motivation in Research - Research Approaches, Significance of Research - Research Methods Verses Methodology - Research and Scientific Method - Research Process - Criteria of Good Research - Problems Encountered by Researchers in India. Defining the Research Problem: What is a Research Problem? - Selecting the Problem - Technique Involved in Defining a Problem - Research Design: Meaning - Need for research Design - Features of a Good Design - Important Concept relating to Research Design - Different Research Designs - Basic Principles of Experimental Designs. (**12L**)

UNIT II

Sampling Design: Census and sample survey - Implications of a sample design - Steps in sample design - Criteria of selecting a sampling procedure - Characteristics of a good sample design - Different types of sample designs - How to select a random sample? - Random sample from an infinite Universe - Complex random sampling designs - Measurement and scaling Techniques: measurement in research - Measurement scales - Sources of error in measurement - Tests of sound measurements - Technique of developing measurement tools - Scaling, meaning of scaling - Scale classification bases - Important scaling techniques - Scale construction techniques. (**12L**)

UNIT III

Methods of Data Collection - Collection of Primary Data - Observation Method - Interview method - Collection of Data through Questionnaires - Collection of Data through Schedules - Some Other Methods of Data Collection - Collection of Secondary Data - Selection of Appropriate Method for Data Collection - Interpretation and Report writing - Meaning of Interpretation, Why Interpretation? - Technique of Interpretation, Precaution in Interpretation - Significance of Report Writing - Different Steps in Writing Report - Layout of the Research Report - Types of Reports - Mechanics of Writing a Research Report - Precautions for Writing Research Reports. (**12L**)

UNIT IV

Chi-Square Test for large samples – Definition of Chi-Square – Limitations of Chi-Square test - Chi-Square test as a test of goodness of fit and as a test of independence – Yate's correction and its applications – Analysis of variance(ANOVA) : Concept – One way ANOVA – ANOVA in test in Latin Square Design (**12L**)

Unit - V

Algorithmic Research – Introduction - Algorithmic Research Problems - Types of Solution procedure/Algorithm - Steps of Development of Algorithm - Steps of algorithmic Research - Design of Experiments and Comparison of Algorithms - Meta Heuristics for Combinatorial Problems - The Computer: Its Role in research - The computer and Computer Technology - The Computer System - Important Characteristics - Computer Applications- Computers and Researchers. (**12L**)

REFERENCE BOOKS:

1. C.R.Kothari, "Research Methodology Methods and Techniques", (Second Revised Edition), New Age International Publishers, New Delhi, 2010.
2. R.Panneerselvam, "Research Methodology", PHI Learning Private Limited, New Delhi, 2009.

Elective – II Group: (A).NET PROGRAMMING

UNIT I

HTML - Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head & Body Sections, Building HTML documents, Inserting texts, Images, Hyperlinks, Backgrounds and Colour controls, Different HTML tags, Table layout and presentation, Use of front size & Attributes. List types and its tags, Use of Frames and Forms in web pages, ASP & HTML Forms. (**10L**)

UNIT II

Overview of Dynamic Web page, introduction & features of ASP.NET, Understanding ASP.NET Controls, Applications, Web servers, installation of IIS. Web forms, web form controls -server controls, client controls. Adding controls to a web form, Buttons, Text Box , Labels, Checkbox, Radio Buttons, List Box. Adding controls at runtime. Running a web Application, creating a multiform web project. Form Validation: Client side validation, server Side validation, Validation Controls : Required Field Comparison Range. Calendar control, Ad rotator Control, Internet Explorer Control. (**13L**)

UNIT III

Overview of ADO.NET, from ADO to ADO.NET. ADO.NET architecture, Accessing Data using Data Adapters and Datasets, using Command & Data Reader, binding data to data bind Controls, displaying data in data grid. XML in .NET, XML basics, attributes, fundamental XML classes: Document, textwriter, textreader. XML validations, XML in ADO.NET, The XMLDataDocument. (**13L**)

UNIT-IV

Web services: Introduction, State management- View state, Session state, Application state. SOAP, web service description language, building & consuming a web service. Web application deployment. Caching. Threading Concepts, Creating Threads in .NET, managing threads, Thread Synchronization Security features of .NET, Role based security & Code access security, permissions (**12L**)

UNIT-V

Overview of C#, C# and .NET, similarities & differences from JAVA, Structure of C# program. Language features: Type system, boxing and unboxing, flow controls, classes, interfaces, Serialization and Persistence, Serializing an Object, Deserializing an Object Delegates, Reflection. (**12L**)

REFERENCE BOOKS

1. The Complete Reference ASP.NET by Mathew Macdonald – TMH Professional ASP.NET- Wrox publication
2. VB.NET Programming Black Book by steven holzner –dreamtech publications
3. Introduction to .NET framework-Worx publication . ASP.NET Unleashed C# programming – wrox publication
4. C# programming Black Book by Matt telles – Dreamtech Publication

Elective – II Group:(B) DIGITAL IMAGE PROCESSING

Unit 1

Introduction: What is Digital Image Processing? – Fundamentals Steps in DIP – Components of an Image Processing System.
Digital Image Fundamentals: Light and Electromagnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – Some Basic Relationships between Pixels. **(12L)**

Unit 2

Image Enhancement in the Spatial Domain: Some Basic Gray Level Transformations – Histogram Processing – Enhancement Using Arithmetic/Logic Operations – Basics of Spatial Filtering – Smoothing Spatial Filters – Sharpening Spatial Filters.
Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain – Smoothing Frequency-Domain Filters – Sharpening Frequency Domain Filters. **(13L)**

Unit 3

Image Restoration: A Model of the Image Degradation/Restoration Process – Noise Models – Restoration in the presence of Noise Only-Spatial Filtering.
Image Compression: Fundamentals – Image Compression Models – Error-free Compression – Lossy Compression – Image Compression Standards. **(13L)**

Unit 4

Morphological Image Processing: Preliminaries – Dilation and Erosion – Opening and Closing – The Hit-or-Miss Transformation – Some Basic Morphological Algorithms.
Segmentation: Detection and Discontinuities – Edge Linking and Boundary Detection – Thresholding – Region-Based Segmentation. **(12L)**

Unit 5

Representation and Description: Representation – Boundary Descriptors – Regional Descriptors.
Object Recognition: Patterns and Pattern Classes – Structural Methods. **(10L)**

REFERENCE BOOKS:

1. Digital Image Processing – Rafael C.Gonzalez and Richard E.Woods, Pearson Education, 2009.
2. Digital Image Processing and Analysis – B.Chanda and D.Dutta Majumder, Prentice Hall India – 2009.
3. Digital Image Processing – S.Jayaram, S.Esakkirajan, T.Veerakumar, Tata McGraw Hill Education Private Limited, New Delhi, 2011.

Elective – II Group: (C) CLOUD COMPUTING

Unit I

Distributed System Models and Enabling Technologies: Scalable Computing over the Internet, Technologies for Network-Based Systems, System Models for Distributed and Cloud Computing, Software Environments for Distributed Systems and Clouds, Performance, Security and Energy Efficiency
Computer Clusters for Scalable Parallel Computing: Clustering for Massive Parallelism, Computer Clusters and MPP Architectures, Design Principles of Computer Clusters, Cluster Job ad Resource Management. **(12L)**

Unit II

Cloud Platform Architecture over Virtualized Data Centers: Cloud Computing and Service Models, Data-Center Design and Interconnection Networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms GAE, AWS, and Azure, Inter-cloud Resource Management, Cloud Security and Trust Management. **(13L)**

Unit III

Service-Oriented Architectures for Distributed Computing: Services and Service-Oriented Architecture, Message-Oriented Middle-ware, Portals and Science Gateways, Discovery, Registries, Metadata and Databases, Work-flow in Service-Oriented Architectures. **(10L)**

Unit IV

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, Parallel and Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments. **(12L)**

Unit V

Ubiquitous Clouds and the Internet of Things: Cloud Trends in Supporting Ubiquitous Computing, Performance of Distributed Systems and the Cloud, Enabling Technologies for the Internet of Things, Innovative Applications of the Internet of Things, On-line Social and Professional Networking. **(13L)**

REFERENCE BOOKS:

1. Distributed and Cloud Computing- Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra –Elsevier-2012
2. Cloud Computing – A Hands-on Approach – Arshdeep Bahga, Vijay Madisetti – University Press, 2014
3. Enterprise Cloud Computing – Gautam Shroff – Cambridge University Press - 2010

DBMS LAB –Practical Lists

1. Table creation and Manipulations – Insert, Delete, Select and Update
2. Use of constraints – primary key, references, unique, not null, default etc. in Table creation.
3. Creation and use of sequence, index schema objects in table manipulations
4. PL/SQL program to generate Multiplication Table

5. PL/SQL program for cursor Management
6. PL/SQL program for Raising application error.
7. Create of function to check whether the given string is a palindrome or not.
8. PL/SQL program for demonstrating user defined Exception in oracle
9. PL/SQL program for demonstrating built-in Exception
10. PL/SQL program for demonstrating built-in Exception
11. Creation of procedure for electricity bill preparation using table
12. PL/SQL program for demonstrating trigger procedure.