

**MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI**

PG - COURSES – AFFILIATED COLLEGES

Course Structure for M.Sc. Information Technology

(Choice Based Credit System)

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

Semester	Title of the Subject	Status	Contact Hrs./ Week	Credits
III	Advanced Operating System	Core-14	4	4
	Advanced Database System	Core-15	4	4
	Big Data Analytics	Core-16	4	4
	Research Methodology	Core-17	4	4
	Elective-2 (select any one from Elective – II group)	Elective -2	4	3
	DBMS – Lab	Core Practical-5	4	2
	Mini Project Lab	Core Project-1	6+6*	6
IV	Main Project Lab	Core Project-2	30+2*	16

*Extra hours for Project

For the Project, flexible 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 : 20 (13 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) Digital Image Processing
- (C) Cloud Computing

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.

SEM. III CORE PAPER-1: ADVANCED OPERATING SYSTEM

L-T-P-C
4 -0-0- 4

Preamble : Understanding the concepts of process, memory, I/O management of OS

Prerequisite : Basic knowledge of 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 Calls - 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

Case Study:

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”, Prentice Hall of India, Second Edition.
3. H. M. Deitel, “Operating Systems”, Pearson Education, Second Edition.

OUTCOMES:

On successful completion of the course the students should have:

- Able to understand the operating system components and its services
- Implement the algorithms in process management and solving the issues of IPC
- Able to demonstrate the mapping between the physical memory and virtual memory
- Able to understand file handling concepts in OS perspective
- Able to understand the operating system components and services with the recent OS

ADVANCED DATABASE MANAGEMENT SYSTEMS

L T P C
4 -0-0- 4

Preamble : Understanding the concepts of Normalization, SQL and PL-SQL programming in ORACLE

Prerequisite : Basic knowledge of DBMS

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, Joins and Triggers:

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- Abraham 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

OUTCOMES:

On successful completion of the course the students should have:

- Understood the basic principles of database management systems
- Gained knowledge over various database models, schemes and SQL statements.
- Gained knowledge over various oracle features like Joins, Cursors, Triggers, etc.

BIG DATA ANALYTICS

L T P C

4 -0-0- 4

Preamble : Understanding the concepts of Big Data system and its architecture

Prerequisite : Basic knowledge of Data processing systems

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 file systems 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:

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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 – Stream 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.

OUTCOMES:

Upon Completion of the course, the students should be able to:

- Work with big data platform and Understand the fundamentals of various big data analysis techniques
- Analyze the big data analytic techniques for useful business applications.

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- Design efficient algorithms for mining the data from large volumes.
- Analyze the HADOOP and Map Reduce technologies associated with big data analytics
- Explore the applications of Big Data

RESEARCH METHODOLOGY

L T P C
4 -0-0- 4

Preamble : Understanding the concepts of Research approaches, tools etc

Prerequisite : Basic knowledge in computer algorithms, Statistics etc.

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

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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.

OUTCOMES:

At the end of this course, the students should be able to:

- understand some basic concepts of research and its methodologies
- identify appropriate research topics
- select and define appropriate research problem and parameters
- prepare a project proposal (to undertake a project)
- organize and conduct research (advanced project) in a more appropriate manner

NET PROGRAMMING

L T P C
4 -0-0- 3

Preamble : Understanding the concepts of developing applications using validation, database classes

Prerequisite : Basic knowledge of HTML, Visual Basic, C# 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 font 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, Adrotator Control, Internet Explorer Control. **(13L)**

Unit-III

Overview of ADO.NET:

Evolution 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)**

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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

OUTCOMES:

On successful completion of the course the students should have:

- Gained knowledge in basics of HTML, XML,C# and Web Services
- Understood ASP.NET programming concepts and role of validation controls in Asp.Net applications

DIGITAL IMAGE PROCESSING

L T P C
4 -0-0- 3

Preamble : Understanding the concepts in computer based Image processing processes

Prerequisite : Basic knowledge of computer Graphics

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.

OUTCOMES:

Upon Completion of the course, the students should be able to:

- Review the fundamental concepts of a digital image processing system.
- Analyze images in the frequency domain using various transforms.
- Evaluate the techniques for image enhancement and image restoration.
- Interpret image segmentation and representation techniques.
- Categorize various compression techniques.
- Interpret Image compression standards.

CLOUD COMPUTING

L T P C

4 -0-0- 3

Preamble : Understanding the concepts in Cloud Architecture and Computing

Prerequisite : Basic knowledge of computer Architecture and parallel processing

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 and 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 Service 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

OUTCOMES:

Upon Completion of the course, the students should be able to:

- Compare the strengths and limitations of cloud computing
- Identify the architecture, infrastructure and delivery models of cloud computing
- Apply suitable virtualization concept.
- Choose the appropriate cloud player, Programming Models and approach.
- Address the core issues of cloud computing such as security, privacy and interoperability.
- Design Cloud Services and Set a private cloud

DBMS LAB –Practical Lists

L T P C

0 -0-4- 2

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. Creation of procedure for electricity bill preparation using table
11. PL/SQL program for demonstrating trigger procedure.

OUTCOMES:

Upon Completion of the course, the students should be able to:

- Design and Implement databases practically
- Formulate execute complex queries using SQL
- Write and execute PL/SQL programs.
- Design and Implement applications that have GUI and access databases for backend connectivity

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Mini Project

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Project

L T P C
0 0 30+2* 16