

SADAKATHULLAH APPA COLLEGE

(AUTONOMOUS)

(Reaccredited by NAAC at an 'A' Grade with a CGPA of 3.40 out of 4.00 in the III cycle An ISO 9001:2008 Certified Institution)

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Tamilnadu

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE (Unaided)



CBCS SYLLABUS

For

M.Sc. Computer Science

(Applicable for students admitted in June 2015 and onwards)

**(As per the Resolutions of the Academic Council
Meeting held on 23.02.2016)**

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M.Sc. COMPUTER SCIENCE**Course Structure (CBCS)**

I Semester			II Semester		
Course	H/W	C	Course	H/W	C
Core 1	6	4	Core 5	6	4
Core 2	6	5	Core 6	6	5
Core 3	6	5	Core 7	6	5
Core 4	6	5	Core 8	6	5
Core Practical – I *	6	–	Core Practical-I	–	3
			Core Practical – II	6	3
Total	30	19	Total	30	25
III Semester			IV Semester		
Core 9	6	5	Core 12	6	5
Core 10	6	5	Core 13	6	5
Core 11	6	5	Core 14 – Project	6	5
Core Practical – III *	6	–	Core Practical – III*	–	3
Non Major Elective	6	5	Core Practical – IV*	6	3
			Core Elective	6	5
Total	30	20	Total	30	26

* Examination at the end of Even semester

Distribution of Hours, Credits, No. of Papers, & Marks

Subject	Hours	Credits	No of papers	Marks
Core + practical	108	80	14 + 4	1800
Major Elective	6	5	1	100
Non Major Elective	6	5	1	100
Total	120	90	20	2000

DEPARTMENT OF COMPUTER SCIENCE (PG)

CBCS SYLLABUS – M.Sc. Computer Science

SEM	P	Title of the paper	S. Code	H/W	C	Marks		
						I	E	T
I	C1	Design and Analysis of Algorithm	15PCSC11	6	4	25	75	100
	C2	Advanced Database Management System	15PCSC12	6	5	25	75	100
	C3	Advanced Java Programming	15PCSC13	6	5	25	75	100
	C4	Advanced Networking Concepts	15PCSC14	6	5	25	75	100
	CP1	Core Practical – I (Advanced Java Programming Lab)	–	6	–	Examination II Semester		
II	C5	Android and Applications Development	15PCSC21	6	4	25	75	100
	C6	Software Project Management	15PCSC22	6	5	25	75	100
	C7	Web Programming I	15PCSC23	6	5	25	75	100
	C8	Data Mining and Data Warehousing	15PCSC24	6	5	25	75	100
	CP1	Core Practical – I (Advanced Java Programming Lab)	15PCSC2P1	–	3	40	60	100
	CP2	Core Practical – II (Web Programming I Lab)	15PCSC2P2	6	3	40	60	100
III	C9	Mobile Computing	15PCSC31	6	5	25	75	100
	C10	Principles of Compiler Design	15PCSC32	6	5	25	75	100
	C11	Web Programming II	15PCSC33	6	5	25	75	100
	CP3	Core Practical – III (Web Programming II Lab)	–	6	–	Examination IV Semester		
	E(NM)	Choose from the List	–	6	5	25	75	100
IV	C12	Cloud Computing	15PCSC41	6	5	25	75	100
	C13	Soft Computing	15PCSC42	6	5	25	75	100
	C14	Project	15PCSP41	6	5	–	100	100
	CP3	Core Practical – III * (Web Programming II Lab)	15PCSC4P1	–	3	40	60	100
	CP4	Core Practical – IV * (Image Processing Lab)	15PCSC4P2	6	3	40	60	100
	E(M)	A) Digital Image Processing	15PCSE4A	6	5	40	60	100
		B) OOAD and UML	15PCSE4B					
			Total	120	90	535	1465	2000

DEPARTMENT OF COMPUTER SCIENCE (PG)

Non-Major Elective Course offered to Other Major PG Students

SEM	P	Title of the paper	S. Code	H/W	C	Marks		
						I	E	T
I	E(NM)	Internet Concepts and Web Design	15PCSN31	6	5	25	75	100
			Total	6	5	25	75	100

**LIST OF NON-MAJOR ELECTIVE COURSES OFFERED TO PG
STUDENTS BY VARIOUS DEPARTMENTS**

SEM	TITLE OF THE PAPER	S.CODE	H/W	C	MARKS		
					I	E	T
DEPT. OF ENGLISH (PG)							
III	English For Business Communication	15PENN31	6	5	25	75	100
DEPT. OF COMPUTER SCIENCE (PG)							
III	Internet Concepts and Web Design	15PCSN31	6	5	25	75	100
DEPT. OF MATHEMATICS (PG)							
III	Basics in Mathematics	15PMAN31	6	5	25	75	100
DEPT. OF PHYSICS (PG)							
III	Renewable Energy Sources	15PPHN31	6	5	25	75	100

I SEMESTER			
C 1	DESIGN AND ANALYSIS OF ALGORITHM	15PCSC11	
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 4

UNIT-I : MATHEMATICS REVIEW

Mathematics Review, background model – Algorithm analysis – running time calculations – General rules – Solutions for the maximum subsequence sum problem – Logarithms in the running time – checking analysis.

UNIT-II : ABSTRACT DATA TYPE (ADT)

Abstract Data Type (ADT) – List ADT – Array implementation of lists – Linked List – Doubly and circularly linked lists – Stack ADT – Queue ADT – Trees: Binary trees – Binary search trees.

UNIT-III : HASHING

Hash function – open Hashing – Closed Hashing – Priority Queues (Heaps): Binary Heap – Applications of priority queues Sorting: Insertion Sort – Shell Sort – Heapsort – Mergesort – Quicksort.

UNIT-IV : GRAPH ALGORITHMS

Topological sort – Shortest Path algorithms – Network Flow Problems – Minimum Spanning tree – Application of DFS.

UNIT-V : ALGORITHM DESIGN TECHNIQUES

Algorithm Design Techniques – Greedy Algorithms: Scheduling problem – Huffman codes – Approximate bin packing – Divide and Conquer : Running time of Divide and Conquer algorithms – Closest – Points problem – The selection problem – Theoretical Improvements for Arithmetic Problems.

TEXT BOOKS:

1. Data Structures and Algorithms Analysis in C++ - Mark Allen Weiss: Pearson Education Asia
2. Data Structures, Algorithms and Applications in C++ - Sahni : McGraw Hill Publication.

I SEMESTER			
C 2	ADVANCED DATABASE MANAGEMENT SYSTEM	15PCSC12	
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT-I : RELATIONAL MODEL

Introduction - Structure of Relational Data Base - Relational Algebra - Relational Calculus. Relational Query Languages - Introduction - Codd's Rules - Structured Query Language - Embedded Structured Query Language. ER Model - Basic Concepts - Conversion of ER Model into Relations - ER Diagram Symbols.

UNIT-II : DATA BASE DESIGN

Introduction - Software Development Life Cycle - Database Development Life Cycle - Automated Design Tools. Functional Dependency and Decomposition - Functional Dependency - Decomposition. Normalization - Introduction - Normalization - Normal Forms - BCNF - 4 NF - 5 NF.

UNIT-III : QUERY PROCESSING AND OPTIMIZATION

Introduction - Query Processing - Syntax Analyzer - Query Decomposition - Query Optimization. Transaction Processing and Concurrency Control: Transaction Concepts - Concurrency Control - Locking Methods - Timestamp Methods - Optimistic Methods.

UNIT-IV : DATA BASE RECOVERY SYSTEMS

Introduction - Recovery Concepts - Types of Failures - Types of Recovery - Recovery Techniques - Buffer Management. Data Base Security: Goals - Firewalls - Data Encryption.

UNIT-V : DISTRIBUTED DATA BASE SYSTEMS

Introduction - Distributed Data Bases - Architecture of Distributed Data Bases - Distributed Data Base System Design - Distributed Query Processing. Emerging Data Base Technologies: Internet Data Bases - Digital Libraries - Multimedia Data Bases - Mobile Data Bases - Spatial Data Bases.

TEXT BOOKS:

1. S.K. Singh, "Database Systems Concepts, Design and Applications", Pearson Education Pte. Ltd., New Delhi: 2006.
2. C.J. Date and others, "An Introduction to Database Systems", Eighth Edition, Pearson Education Pte. Ltd., New Delhi: 2006.

REFERENCE BOOKS:

1. Abraham Silberschatz, "Database Systems", McGraw Hill International, 1997.
2. Paneerselvam R, "Database management systems", PHI, 2005.
3. Narang Rajesh, "Database management systems", PHI, 2005.
4. ISRD Group, "Introduction to database management systems", TMG, 2006.
5. Ramakrishnan, Gehrke, "Database management systems", 3/E, TMG, 2003.

I SEMESTER			
C 3	ADVANCED JAVA PROGRAMMING		15PCSC13
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT-I : APPLET AND SWING

Introduction to Applet and swing – Creating Applet in Java, Identifying various stages of an Applet life Cycle, Graphics method in Java , the AWT control Components, Layout Manager ,A Tour of Swing.

UNIT-II : JDBC

Understanding JDBC Programming Basics : Setting up your first JDBC Query - Connecting to Databases with JDBC - Building JDBC Statements – Working with Resultsets – Understanding JDBC Datatypes.

UNIT-III : SERVLET

Background – The Life cycle of a Servlet – A Simple Servlet – The Servlet API – The javax.servlet Package – Reading Servlet Parameters – The javax.servlet.http Package – Handling HTTP Requests and Responses – Cookies – Session Tracking.

UNIT-IV : RMI & BEANS

Overview of Java RMI - A Simple Client/Server applications using RMI - Introduction to Bean- Advantages of Java Bean- Application Builder Tools – BDK - JAR files – Introspection - Developing Simple Bean – Using Bound Properties – Using the BeanInfo Interface – Constrained Properties - Persistence – Customizers –Java Beans API.

UNIT-V : JSP

Introduction – What and Why use JSP – JSP Overview : The Problem with Servlets – The anatomy of a JSP Page – JSP Processing - JSP Application Development : Generating Dynamic Content – Building Web application with Java Server pages and Servlets.

TEXT BOOKS:

1. Unit I,III & IV: Herbert Schildt, Java 2 complete Reference, Tata McGraw Hill.
2. Unit II : Todd M. Thomas, Java Data Access, M&T Books.
3. Unit V: Hans Bergsten, “Java Server Pages”, SPD O’Reilly.

REFERENCE BOOKS:

1. Ken Arnold, Crosling Homles, “The Java Programming Language” Pearson Education III Edition.
2. Harley Hahn, The Internet – Complete Reference , Tata McGraw Hill 1997.
3. Advance Java Programming – AmitK.Mishra.
4. Black Book- Java Programmming _Dreamtech.

I SEMESTER			
C4	ADVANCED NETWORKING CONCEPTS		15PCSC14
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT-I : HIGH SPEED NETWORKS

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL, High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements – Architecture of 802.1.

UNIT-II : CONGESTION AND TRAFFIC MANAGEMENT

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion –Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT-III : TCP AND ATM CONGESTION CONTROL

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management –Exponential RTO back off – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes –Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT-IV : INTEGRATED AND DIFFERENTIATED SERVICES

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services

UNIT-V : PROTOCOLS FOR QOS SUPPORT

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms –Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP –Protocol Architecture, Data Transfer Protocol, RTCP.

TEXT BOOK:

William Stallings, “HIGH SPEED NETWORKS AND INTERNET”, Pearson

Education, Second Edition, 2008.

REFERENCES:

1. Warland, Pravin Varaiya, “High performance communication networks”, Second Edition, Jean Harcourt Asia Pvt. Ltd., 2001.
2. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, “MPLS and VPN architecture”, Cisco Press, Volume 1 and 2, 2003.
3. Abhijit S. Pandya, Ercan Sea, “ATM Technology for Broad Band Telecommunication Networks”, CRC Press, New York, 2004.

I SEMESTER		
CP 1	CORE PRACTICAL – I (Exam end of II Sem.)	15PCSC2P1
Hrs / Week : 6	Hrs / Sem : 90	Credits : 3

CORE PRACTICAL – I * (Advanced Java Programming Lab)

1. Program using Applet
2. Program using Swing
3. Developing applications using JDBC
4. Program using Servlet
5. Programs using RMI
6. Implementation of Java Bean
7. Programs using JSP

II SEMESTER			
C 5	ANDROID AND APPLICATIONS DEVELOPMENT		15PCSC21
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 4

UNIT-I : INTRODUCTION TO ANDROID

What is Android – Advantages of Android – Preparing of Liftoff: Java – Eclipse – Android – SDK. – Android Development Environment: Installing Java, Eclipse and Android – updating the Android SDK: Setting up AVDs and Smart Phone Connections – Developing on 64 Bit Computing Platforms

UNIT-II : ANDROID SOFTWARE DEVELOPMENT PLATFORM

Introducing the Android Software Development Platform: Understanding Java SE and the Dalvik Virtual Machine – The directory Structure – Android XML and Android Application Resources – Launching Application: Android Manifest.XML – Creating your first Android Application – Android Frame work Overview – Foundation of OOPS – Overview of XML – The APK File – Android Application Components – Android Intent Objects – Android Manifest XML

UNIT-III : SCREEN LAYOUTS DESIGN

Views and Layouts – Android view Hierarchical – Defining Screen Layouts using XML – UI Design: Buttons, Menus, Dialogs – Using Common UI Elements – Using Menus in Android – Adding Dialogs

UNIT-IV : GRAPHIC RESOURCES IN ANDROID

An Introduction to Graphic Resources in Android: Introducing the Drawables – Using Bitmap Images in Android – Creating Animation in Android – Using Transitions – Creating 9-Patch Customs Scalable Images – Playing Video in your Android Apps - Adding Interactivity: Handling UI events - An overview of UI events in Android

– Handling Onclick events, Ontouch, Onlong click, Context Menus in Android: Oncreate Context Menu

UNIT-V : DATA STORAGE IN ANDROID

In understanding content providers: An overview of Android Content Providers – Defining a Content Providers – Working with a Database – Understanding Intents and Intent Filters – What is an Intent – Android Intent Messaging via Intent Objects – Intent Resolution: Implicit Intents and Explicit Intents – Using Intents with Activities – Android Services – The Future: Widgets – Location Basis Services in Android – Google Maps in Android – Google Search in Android – Data Storage in Android – Device Administration: Security for IT – Using the Android Camera Class to Control a Camera – 3D Graphics – Face Detector – Sound Pool – Media Recorder

TEXT BOOK :

Android Apps for Absolute Beginners 2nd Edition by Wallace Jackson, Apress

REFERENCE BOOKS :

1. Professional Android Open Accessory Programming with Arduino by Andreas Goransson, David Cuartielles Ruiz
2. Enterprise Android Programming Android Database Application for the Enterprise by Zigurd Mednieks, G.BlakeMeike, Laird Dornin, Zane Pan

II SEMESTER			
C6	SOFTWARE PROJECT MANAGEMENT		15PCSC22
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT-I : INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT (SPM)

Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization. An Overview of Project Planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan.

UNIT-II : PROJECT EVALUATION & ESTIMATION

Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project report: Choosing technologies, choice of process model, structured methods, rapid application development, water fall, V-process, spiralmmodels. Prototyping, incremental delivery. Effort Estimation: Albrecht function point analysis.

UNIT-III : ACTIVITY PLANNING & RISK MANAGEMENT

Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity float, shortening project , precedence networks. Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values.

UNIT-IV : RESOURCE ALLOCATION & MONITORING THE CONTROL

Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence. Monitoring the control: Introduction, creating the frame work, collecting the data, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, change control.

UNIT-V : MANAGING CONTRACTS AND SOFTWARE QUALITY

Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, software quality : Introduction, The place of software quality in project planning, The importance of software quality, Defining software quality, Product and Process Metrics, Product vs Process quality management, Techniques to Enhance software quality, Testing

Text Book:

1. Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH

Reference Books:

1. Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH
2. Software Project Management, Walker Royce, 1998, Addison Wesley.
3. Project Management 2/c. Maylor
4. Managing Global software Projects, Ramesh, 2001, TMH.

II SEMESTER			
C 7	WEB PROGRAMMING I		15PCSC23
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT -I : INTRODUCTION TO PHP

What, Why and Evolution of PHP?, Installing PHP, Create PHP Script, Running PHP Script. PHP Language Basics: Variables, Data Types, Operators & Expressions, Constants. Decision and Loops: Making Decisions, Doing repetitive tasks with looping .String: Creating & Accessing String, String Manipulation using string functions.

UNIT-II : ARRAYS, FUNCTIONS, CLASSES AND OBJECTS

Arrays : Anatomy of an Array, Creating Arrays, Accessing Array Elements, Looping through Array, Multidimensional Array, and Manipulating Array using array functions. Functions: What and why function, Calling Function, Variable Function, User-Defined Function, Working with references, Recursive Function. Classes and Objects: Creating Class and Object, Create and using properties & methods, Overloading, Constructor, Destructor, Object Inheritance.

UNIT-III : PHP WITH MYSQL

Handling FORM with PHP: Capturing form Data with PHP, Dealing with Multi-value Fields, Generating Web Forms, Storing Variable in Forms, Working with Multipage Forms, Creating File Upload Forms, Redirecting form submission. Preserving State in PHP: Saving State with Query String, Working with cookies, PHP Session to store data. Database Connectivity & SQL : Deciding how to store data, Understanding relational databases, Setting Up MySQL, Connecting to MySQL from PHP, Retrieving Data from MySQL (Select), Manipulating MySQL Data with PHP (insertion, updation and deletion).

UNIT-IV : INTRODUCTION TO PYTHON

The way of the program, Variables, Expressions and Statements, Functions, Conditionals and recursions, Fruitful Functions, Iterations, Strings, Lists, Dictionaries, Tuples and Files.

UNIT-V : OBJECT ORIENTED PROGRAMMING WITH PYTHON

Classes and Objects, Classes and Functions, Classes and Methods, Inheritance.

TEXT BOOKS:

1. BEGINNING PHP 5.3 by MATT DOYLE WROX publication
2. Think Python How to Think Like a Computer Scientist by Allen B. Downey, O'Reilly publications

REFERENCE BOOKS :

1. Head First Python Paul Barry O'Reilly publications
2. PHP 5 Power Programming Andi Gutmans, Stig Saether Bakken and Derick Rethans

II SEMESTER			
C8	DATA MINING AND DATA WAREHOUSING		15PCSC24
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT-I : DATA MINING

Introduction : Data mining – Data mining functionalities – kinds of patterns can be mined – classification – major issues. Data warehouse – A multidimensional data model – Data warehouse architecture – Data warehouse implementation – From data warehouse to data mining.

UNIT-II : DATA PROCESSING

Data preprocessing – Data cleaning – Data Integration and Transformation – Data Reduction – Discretization and concept hierarchy generation – Data mining primitives – Data mining Task

UNIT-III : ASSOCIATION RULES

Association Rule Mining – Mining single dimensional Boolean association rules from transactional databases –. Classification and prediction – Issues regarding classification and prediction – Bayesian classification Classification by Back propagation – classification based on concepts from association rule mining

UNIT-IV : DATA MINING TECHNIQUES

Cluster Analysis-A categorization of Major clustering methods- Partitioning methods Hierarchical methods -Grid based methods - Model based clustering methods Density - based methods.

UNIT - V : APPLICATIONS

Applications and Trends in Data Mining – Data mining system Products and Research prototypes – Additional themes on Data mining – Social Impacts of Data Mining – Trends in Data mining Mining Spatial Databases – Mining Time series and sequence data – Mining the World wide web.

TEXT BOOK:

Jiwei Han, Michelen Kamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann Publishers an Imprint Of Elsevier, 2001.(Chapters 1,2,3,4.1,6.1,6.2,7,8,9.2,9.4,9.6,10)

REFERENCE BOOKS:

1. ArunK.Pujari, Data Mining Techniques, Universities Press(India) Limited, 2001.
2. George M. Marakas, Modern Data warehousing, Mining and Visualization: core concepts, Printice Hall, FirstEdition, 2002.
3. PangNing Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson, 2008.
4. Soman K. P, ShyamDiwakar, V. Ajay, Data Mining, Prentice Hall, 2008.

II SEMESTER		
CP2	Core Practical II (Exam end of II Sem.)	15PCSC2P2
Hrs / Week : 6	Hrs / Sem : 90	Credits : 3

CORE PRACTICAL – II * (Web Programming I Lab)

1. Write a PHP code to print the multiplication table
2. Write a PHP code using string and numeric functions
3. Write a PHP code using array functions
4. Design a HTML form using HTML control and write a PHP code for displaying the employees information
5. Write a PHP code for Adding, Deleting and Modifying records.
6. Write a PHP code using function.
7. Write a Python code on Control structures
8. Write a Python code on String manipulations
9. Write a Python code on List Manipulations
10. Write a Python code on Dictionaries and Tuples

III SEMESTER			
C9	MOBILE COMPUTING		15PCSC31
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT- I: INTRODUCTION TO MOBILE COMPUTING

Mobility of bits and bytes – Wireless the beginning – Developing mobile Computing application – Mobile computing architecture – GSM – Architecture- Entities – Call Routing in GSM – PLMN Interfaces.

UNIT- II: INTRODUCTION TO DIGITAL TRANSMISSION

Digital to Digital Conversion – Line Coding – line coding schemes – Block coding – Scrambling – Analog-to – Digital Conversion - Pulse code modulation –delta modulation – Transmission modes – Parallel Transmission – Serial Transmission.

UNIT- III : WAP & 3G

Introduction to WAP – MMS, GPRS Application; CDMA and 3G: Spread Spectrum technology CDMA Vs GSM – wireless data – third generation networks – application on 3G

UNIT-IV : WIRELESS LAN, INTERNET NETWORKS AND INTERNETWORKING

Introduction – Wireless LAN advantages IEEE802.11 standards wireless LAN architecture – mobility in wireless LAN - Wireless LAN security – Fundamentals of call processing – Intelligence in the networks – SS#7 – INCM – softswitch – programmable networks – Technologies and interfaces for IN.

UNIT- V : PROTOCOLS SUPPORTING MOBILITY

Mobile network layer protocols such as mobile IP –Dynamic Host Configuration Protocol (DHCP)- Mobile transport layer protocols such mobile TCP, indirect –TCP – Wireless Application Protocol (WAP).

TEXTBOOKS:

1. Asoke K Talukder & Roopa R Yavagal, Mobile Computing, Tata McGraw-Hill Publishing Company Limited, 2002, Chapters 4,5 ,Chapters 1,2,8,9,10,11
2. J.Schiller, Mobile Communications, ISBN:0-321-12381-6, Addison-Wesley, 2003,
3. BehrouzA Forouzan, Data Communications and Networking, Tata McGraw-Hill Publishing Company Limited, 2002, Chapters.

REFERENCE BOOKS:

1. T.S. Rappaport, Wireless communications, Principle and Practice, Pearson, 2002.
2. A.S.Tanenbaum, Computer Networks, 4th edition, Publisher: Prentice Hall PTR; ISBN: 0130661023; August, 2002.

REFERENCE SITES:

1. www.dcg.ethz.ch
2. www.informatik.uni-goettingen.de
3. www.ebookee.net

III SEMESTER			
C10	PRINCIPLES OF COMPILER DESIGN		15PCSC32
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT-I : INDRODUCTION

Introduction to Compiler: Language Processors- The Structure of a Compiler – The Evolution of Programming Languages – The Science of Building a Compiler – Application of Compiler Technology – Programming Language Basics. A Simple Syntax-Directed Translator: Syntax Definition – Syntax - Directed Translation – Parsing –A Translator of Simple Expression – Lexical Analysis - Symbol Table – Intermediate Code Generation.

UNIT- II : LEXICAL ANALYZER

Lexical Analysis: The Role of the Lexical Analyzer - Input Buffering – Specification of Tokens - Recognition of Tokens – The Lexical- Analyzer Generator Lex – Finite Automata – From Regular Expression to Automata – Design of a Lexical-Analyzer Generator – Optimization of DFA-Based Pattern Matchers.

UNIT- III : SYNTAX ANALYZER

Syntax Analysis: Introduction – Context-Free Grammars – Writing a Grammar – Top-Down Parsing – Bottom-Up Parsing – Introduction to LR Parsing: Simple LR – More Powerful LR Parsers – Using Ambiguous Grammars.

UNIT- IV : INTERMEDIATE-CODE GENERATION AND RUN-TIME ENVIRONMENT

Intermediate-Code Generation: Variants of Syntax Trees – Three-Address Code – Types and Declarations – Translations of Expressions – Type Checking – Control Flow – Back patching – Switch Statements – Intermediate Code for Procedures. Run-Time Environments: Storage Organization – Stack Allocation of Space – Access to Nonlocal Data on the Stack.

UNIT-V : CODE GENERATION

Code Generation: Issues in the Design of a Code Generator – The Target Language – Address in the Target Code – Basic Blocks and Flow Graph – Optimization of Basic Blocks – A Simple Code Generator – Peephole Optimization – Register Allocation and Assignments – Instruction Selection by Tree Rewriting - Optimal Code Generation for Expression – Dynamic Programming Code-Generation. Machine-Independent optimization: The Principal Source of Optimization.

TEXT BOOK:

Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers- Principles, Techniques and Tools”, Pearson Education Asia, 2011.

REFERENCE BOOKS:

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, “Compilers- Principles, Techniques and Tools”, Pearson Education Asia, 2007
2. A.V. Aho, Ravi Sethi, J. D. Ullman, “Compilers- Principles, Techniques and Tools”, Addison- Wesley, 2003.
3. Allen I. Holub, Compiler Design in C, Prentice Hall of India, 2001
4. Fischer Leblanc, Crafting Compiler, Benjamin Cummings, Menlo Park, 1988.

III SEMESTER			
C11	WEB PROGRAMMING II		15PCSC33
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT- I : INTRODUCING VISUAL C#

What Constitutes a Visual C# Program - Storing Data - developing an Application - Applying type conversion - Discovering Visual C# Operators - Understanding Visual C# Statements - Unearthing Arrays - Using Single Dimensional arrays - Using Multidimensional Arrays - Understanding Jagged arrays.

UNIT- II : CLASSES

Understanding Classes - Creating Classes - Understanding Class Members - Getting Started with a Windows Application - Adding a button to a form - Adding code - Understanding the CommonDialog Class.

UNIT- III : ASP.NET APPLICATIONS

Getting started with ASP.Net Applications: Web Forms - Creating ASP.Net Web Forms Applications - IIS Application Roots - HTML and XML in ASP.Net. Using ASP.Net Web Forms for Server Controls: Beginning with Server Controls - Taking a closer look at Web Controls - Illustrating Basic Web controls. Working with validation controls: The Compare Validator control - The Range Validator control - Regular Expression Validator control - Custom Validator control - Validation Summary control - Multiple Validation control.

UNIT- IV : DEVELOPING ASP.NET SERVER CONTROLS

Developing ASP.Net Server Controls: Developing ASP.Net Server Controls - Creating and using Web user control - Creating ASP.Net Pages to Web user controls - Creating and using Composite controls. Using Rich Web controls: AdRotator web server control - Calendar web server control - XML web server control. Debugging ASP.Net Web applications: Tracing ASP.Net Applications - Handling Errors in ASP.Net Applications.

UNIT- V : WORKING WITH XML

Using ADO .NET with ASP .NET: ADO .NET - ADO .NET Object Model – Creating a Data Aware Application. Working with XML in Visual Studio .NET: Getting to know XML – Presenting XML related specifications – Converting Data from Relational format to XML format – Data Binding with XML documents. Deploying Web Applications: Creating a Deployment project – Testing the Installation program.

Text Book:

Mridula Parihar, YeshSingal and Nitin Pandey, “Visual Studio .Net Programming”, PHI, 2002

Reference Books:

1. Dino Esposito, Programming Microsoft ASP.NET 3.5, Microsoft, WP publishers (P) Ltd.
2. Donis Marshall, Programming Microsoft Visual C#2008, WP Publishers (P) Ltd.
3. Nitin Pandey ,” Microsoft ASP.NET”, PHI,2002
4. Kiric Allen Evans, Ashwin Kamanna, Joel and Muller, “XML and ASP.NET”, Pearson Education, First Indian Reprint, 2002
5. “ASP.NET Made Simple”, BPB Publications, First Edition, 2001

III SEMESTER		
CP3	Core Practical - III (Exam end of IV Sem)	15PCSC4P1
Hrs / Week : 6	Hrs / Sem : 90	Credits : 3

CORE PRACTICAL – III * (Web Programming II Lab)

1. Program Using C#
2. Program Using Array
3. Program Using class and objects
4. Designing application using web controls
5. Program Using validator control
6. Designing application for creating and using composite controls
7. Designing application for rich web control using Ad-Rotator
8. Designing application to insert & update using database connection
9. Designing application to select & delete using database connection

IV SEMESTER			
C12	CLOUD COMPUTING		15PCSC41
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT-I : FUNDAMENTALS OF CLOUD COMPUTING

Cloud computing – History of Cloud Computing –Cloud Architecture – Cloud Storage – Why cloud computing Matters – Advantages of Cloud computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services - Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services

UNIT-II : CLOUD SERVICES

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management –Collaborating on Event Management – Collaborating on Contact Management –Collaborating on Project Management – Collaborating on Word Processing –Collaborating on Databases – Storing and Sharing Files – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis.

UNIT- III : INTRODUCTION TO BIG DATA

Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis Vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error

UNIT- IV : DATA ANALYSIS

Regression Modeling - Multivariate Analysis – Bayesian Methods – Bayesian Paradigm - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction - Fuzzy Logic: Extracting Fuzzy Models from Data - Fuzzy Decision Trees

UNIT- V : SEARCH METHODS AND VISUALIZATION

Search by simulated Annealing – Stochastic, Adaptive search by Evaluation – Evaluation Strategies – Genetic Algorithm – Genetic Programming – Visualization – Classification of Visual Data Analysis Techniques – Data Types – Visualization Techniques – Interaction techniques – Specific Visual data analysis Techniques

TEXT BOOKS :

1. Michael Miller, Cloud Computing : Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.

REFERENCE BOOKS :

1. Haley Bear, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs.
2. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
3. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.

IV SEMESTER			
C13	SOFT COMPUTING		15PCSC42
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT- I : NEURAL NETWORK AND SUPERVISED LEARNING NETWORK

Basic Concepts of Neural networks – Evolution of Neural networks-Basic Models of Artificial neural network - Terminologies of ANN-McCulloch - Pitts Neuron - Linear separability - Hebb Network - Applications of Neural networks.

Supervised learning Network – Introduction – Perceptron Networks – Adaptive Linear Neuron – Multiple Adaptive Linear Neurons – Back propagation Network – Radial Basis function Network.

UNIT- II : ASSOCIATIVE MEMORY NETWORKS AND UNSUPERVISED LEARNING NETWORKS

Associative Memory Networks - Introduction – Training algorithms for pattern association – Auto associative Memory Network – Bidirectional Associative Memory – Hopfield Networks.Unsupervised Learning networks - Introduction – Fixed Weight Competitive Nets - Kohonen Self - Organised Maps – Learning Vector Quantization – Adaptive Resonance Theory Network.

UNIT- III : FUZZY LOGIC

Introduction to Classical Sets and Fuzzy Sets—Introduction – Classical sets – Fuzzy Sets. Classical Relation and Fuzzy Relations-Introduction – Cartesian product of a relation -Classical Relation – Fuzzy Relations..Membership Functions – Introduction - Features of Membership Functions – Fuzzification – Methods of Membership Value Assignments. Defuzzification –Introduction – Lambda-Cuts for Fuzzy Sets-Lambda-Cuts for Fuzzy Relations –Defuzzification Methods.

UNIT- IV : GENETIC ALGORITHM

Fundamentals of Genetic Algorithms - History – Basic concepts – Creation of Offsprings – Working principle – Encoding – Fitness Function – Reproduction . Genetic Modelling – Inheritance Operators – Cross Over – Inversion and Deletion – Mutation Operator – Bit-wise Operators – Bit-wise Operators used in GA – Generational Cycle –

Convergence of Genetic Algorithm –Differences and similarities between GA and Other Traditional Methods - Advances in Genetic Algorithm.

UNIT- V : HYBRID SYSTEMS AND APPLICATIONS OF SOFT COMPUTING

Integration of Neural Networks, Fuzzy Logic and Genetic Algorithms – Hybrid Systems –Neural Networks, Fuzzy Logic and Genetic Algorithms Hybrids- Preview of the Hybrid systems to be discussed. Genetic Algorithm based Back propagation Networks-GA based weight determination. ANFIS-Adaptive Neuro - Fuzzy Inference Systems – Introduction – ANFIS Architecture – Hybrid Learning Algorithm. Coactive Neuro - Fuzzy Modeling-Introduction – Framework. Applications of Soft Computing - Introduction – A Fusion approach of Multispectral Images with SAR Image for Flood area Analysis - Optimization of TSP using Genetic Algorithm Approach – Genetic Algorithm based Internet Search Technique.

REFERENCES:

1. S.N Sivanandam S.N Deepa “Principles of Soft Computing”, Wiley –India, 2007.
2. S.Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2004.
3. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI,Pearson Education 2004.
4. S.N.Sivanandam, S.N.Deepa, “Introduction to Genetic Algorithms”, Springer, 2007.
5. Timothy J.Ross,”Fuzzy Logic with Engineering Application “, McGraw Hill, 2000.
6. Davis E. Goldberg, ”Genetic Algorithms: Search, Optimization and Machine Learning” Addison Wesley, N.Y., 2003.

IV SEMESTER		
C14	PROJECT	15PCSP41
Hrs/Week : 6	Hrs/Sem: 90	Credits: 5

Objective:

Every PG student is required to prepare the project subject related – based on the guidelines of his / her project guide.

The following are the guidelines to be adhered to

- The project should be an individual one
- The language for the project is **English**
- The Minimum number of pages should be **60**
- Project observations, suggestions and conclusion shall form part of the project.
- The Projects will be evaluated both by the Internal as well as External Examiner each for 100 marks. The distribution of mark should be **60 marks for the Project Report and 40 marks for the Viva-voce Examination**. The Division of marks for the Project Report is as mentioned below:

Particulars	Internal Examiner	External Examiner
Wording of Title	5	5
Objectives/ Formulation including Hypothesis	5	5
Review of Literature	10	10
Relevance of Project to Social Needs	5	5
Methodology/ Technique/ Procedure Adopted	20	20
Summary/ Findings/ Conclusion	5	5
Bibliography/ Annexure/ Foot notes	10	10
Total	60	60

The average mark of Internal and External Examiner is considered as marks of project report.

IV SEMESTER		
CP4	Core Practical – IV	15PCSC4P2
Hrs / Week : 6	Hrs / Sem : 90	Credits : 3

CORE PRACTICAL – IV *(Image Processing Lab)

1. Image Arithmetic
2. Point Operations
3. Neighbourhood Operations
4. Image Histogram
5. Fourier Transform
6. Color Image Processing
7. Morphological Operations
8. Image Segmentation

IV SEMESTER			
E(M)A	DIGITAL IMAGE PROCESSING	15PCSE4A	
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT-I : INTRODUCTION TO IMAGE PROCESSING

Digital Image Processing – Mat Lab Working Environment – Image Representation – reading images – Displaying images – Writing images – Data classes – Image types – Converting between data classes and image types – Array indexing – M-Function Programming

UNIT-II : SPATIAL DOMAIN AND FREQUENCY DOMAIN PROCESSING

Intensity Transformation functions – Histogram processing and function plotting – spatial filtering – 2-D Discrete Fourier transformation – filtering in the frequency domain – generating and sharpening frequency domain filters

UNIT-III : IMAGE RESTORATION AND COLOR IMAGE PROCESSING

Model of the image degradation / restoration process – Noise models – frequency domain filtering – direct inverse filtering – wiener filtering – constrained least square filtering – Lucy – Richardson algorithm – color image representation

UNIT-IV : IMAGE COMPRESSION

Coding redundancy - inter pixel redundancy – psycho visual redundancy – JPEG compression

UNIT-V : MORPHOLOGICAL IMAGE PROCESSING

Morphological image processing – dilation and erosion – morphological reconstruction

TEXT BOOK:

Rafael C.Conzalez, Richard E. Woods, Steven L. Eddins, Digital Image Processing using MATLAB, Pearson Education Inc, New Delhi, 2007.

REFERENCE BOOKS :

1. Chanda. B. Dutta Majumder, D. Digigal Image Processing and Analysis, Prentice Hall of India, New Delhi, 2007.
2. Gonzalez, R.C., Wintz P Digital Image Processing, Addison-wesley Longman Publishing Co, New Delhi – 1987
3. Scott E. Umbaug, Computer Vision and Image Processing, Prentice Hall International, New Delhi, 1998.

IV SEMESTER			
E(M)B	OOAD and UML		15PCSE4B
Hrs / Week : 6	Hrs / Sem : 90	Hrs / Unit : 18	Credits : 5

UNIT-I : SYSTEM CONSTRUCTION

Structured approach to system construction : SSADM/SADT -
An overview of object oriented systems development & Life cycle

UNIT-II : INTRODUCTION TO UML

Various object oriented methodologies – Introduction to UML

UNIT-III : OBJECT ORIENTED ANALYSIS

Object oriented analysis – Use cases- Object classification, relationships, attributes, methods

UNIT-IV : OBJECT ORIENTED DESIGN

Object oriented design – Design axioms – Designing classes –
Layering the software design :- data access layer, User interface layer, Control/business logic layer

UNIT-V : UML MODELS

UML - Examples on: Behavioral models – Structural models –
Architectural models from real world problems.

TEXT BOOKS :

1. Bahrami Ali, Object oriented systems development, Irwin McGrawHill, 2005(First 4 units covered here).
2. Booch Grady, Rumbaugh James, Jacobson Ivar, The Unified modeling language – User Guide, Pearson education, 2006 (ISBN 81-7758-372-7) (UNIT -5 covered here).

REFERENCE BOOKS :

1. Meilir Page-Jones, “Fundamentals of Object Oriented Design in UML”, 4th ed., Pearson Education, 2008.
2. Pascal Roques, “Modeling Software Systems Using UML2”, 2nd ed., WILEY- Dreamtech India Pvt.Ltd, 2004.
3. Atul Kahate, “Object Oriented Analysis & Design”, 1st ed., The McGraw-Hill Companies, 2008.
4. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, “UML 2 Toolkit”, 1st ed., WILEY DreamtechIndia Pvt. Ltd., 2003.

DEPARTMENT OF COMPUTER SCIENCE (PG)

Non-Major Elective Course offered to Other Major PG Students

IV SEMESTER			
E(N)	INTERNET CONCEPTS AND WEB DESIGN	15PCSN31	
Hrs/Week: 6	Hrs/Sem: 90	Hrs/Unit: 18	Credits: 5

UNIT-I : HISTORY OF HTML

History of HTML-HTML document-HEAD and BODY sections-Title, Prologue, Links-Comment line-Designing the BODY section-Aligning the headings-HR tag-Paragraphs-Tab settings-Images and Pictures-Embedding PNG format images.

UNIT-II : ORDERED AND UN ORDERED LISTS

Ordered and Un Ordered lists-Nested Lists-Headings in a list-Table Handling-Table Creation in HTML-Width of the table and Cells-Cell spanning-Coloring cells-column specification-DHTML and Style sheets-Defining styles-Elements of styles-Linking a style sheet to a HTML document-In -line styles-External style sheets-Internal style sheets-Multiple styles.

UNIT-III : FRAMES

Frames-Frameset definitions-Frame definitions-Nested framesets-Forms-Action attribute-Method attribute-Enctype attribute-Check Boxes-Radio Buttons-Text Fields-Text Areas-Password-Submit and Reset buttons-Drop down list-sample forms.

UNIT-IV : INTRODUCTION TO ASP

Introduction: what is ASP?-ASP Model-The Process of Serving an Active Server Page-Using Scripting Languages-Understanding Objects-Application Object-Request Object-Response Object-Server Object-Session Object.

UNIT-V : WORKING WITH HTML FORMS

Retrieving Form Data-Using Textboxes and Text Areas-Using Radio Buttons and Check boxes-Using Selected Lists-Validating Form Data.

TEXT BOOKS:

1. World Wide Web with HTML, Dr.C.Xavier., Tata McGraw – Hill Publishing Company.
2. Practical Asp, Ivan Bayross, BBP Publications

SCHEME OF EXAMINATIONS UNDER CBCS (2015 - 2018)
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The medium of instruction in all UG and PG courses is English and students shall write the CIA Tests and Semester Examinations in English. However, if the examinations were written in Tamil, the answer papers will be valued.

POSTGRADUATE COURSES

SUBJECT	TOTAL MARKS	CIA TEST	SEMESTER EXAMINATION	PASSING MINIMUM		
				CIA EXAM.	SEM. EXAM.	OVER ALL
Theory	100	25	75	nil	38	50
Practical	100	40	60	nil	30	50
Project	100	nil	Report - 60 marks Viva Voce - 40 marks	nil	50	50

DIVISION OF MARKS FOR CIA TEST

SUBJECT	MARKS	ASSIGNMENT FOR UG / ASSIGNMENT OR SEMINAR FOR PG	REGULARITY	RECORD NOTE	TOTAL MARKS
Theory	20	5	--	--	25
Practical	30	--	5	5	40

1. The duration of each CIA Test is ONE hour and the Semester Examination is THREE hours.
2. Three CIA tests of 20 marks each will be conducted and the average marks of the best two tests out of the three tests will be taken.
3. The I test will be based on the first 1.5 units of the syllabus, the II test will be based on the next 1.5 units of the syllabus and the III test will be based on the next 1.5 units of the syllabus.
4. Two assignments for Undergraduate, Certificate, Diploma and Advanced Diploma Courses and two assignments OR two seminars for Postgraduate Courses.
5. The duration and the pattern of question paper for practical examination may be decided by the respective Boards of Studies. However, out of 60 marks in the semester practical examination, 10 marks may be allotted for record and 50 marks for practical.
6. Three internal practical tests of 25 marks each will be conducted for science students in the even semester and the best two out of the three will be taken. The total 50 marks of the best two tests will be converted to 30 by using the following formula:
$$\left(\frac{\text{Marks secured in the first best Practical Test (Out of 25)} + \text{Marks secured in the next best Practical Test (out of 25)}}{2} \right) \times 0.6$$
7. The Heads of Science Departments are requested to keep a record of attendance of practicals for students to assign marks for regularity.

QUESTION PAPER PATTERN FOR CIA TEST (THEORY)

Duration: 1 Hr

Maximum Marks: 20

Section	Question Type	No. of Questions & Marks	Marks
A	No Choice Answer should not exceed 75 words	2 Questions 2 marks each	$2 \times 2 = 4$
B	Internal choice (Either or type) Answer should not exceed 200 words	2 Questions 4 marks each	$2 \times 4 = 8$
C	Open Choice (Answer ANY ONE out of Two) Answer should not exceed 400 words	1 Question 8 marks	$1 \times 8 = 8$
TOTAL			20 MARKS

QUESTION PAPER PATTERN FOR SEMESTER EXAMINATION (THEORY)

Duration: 3 Hrs

Maximum Marks: 75

Section	Question Type	No. of Questions & Marks	Marks
A	No Choice Answer should not exceed 75 words	10 Questions - 2 marks each (2 Questions from each unit)	$10 \times 2 = 20$
B	Internal choice (Either or type) Answer should not exceed 200 words	5 Questions with internal choice. Each carries 5 marks (Two questions from each unit)	$5 \times 5 = 25$
C	Open Choice (Answer ANY THREE out of FIVE) Answer should not exceed 400 words	3 Questions out of 5 - 10 marks each (1 Question from each unit)	$3 \times 10 = 30$
TOTAL			75 MARKS