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DEPARTMENT OF COMPUTER APPLICATIONS

CBCS SYLLABUS

MASTER OF COMPUTER APPLICATIONS

PROGRAMME CODE - MC

COURSE STRUCTURE

(w.e.f. 2018 – 2019 onwards)

Annexure – 25

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
COURSE STRUCTURE - SEMESTER WISE
(w.e.f. 2018-2019 Batch onwards)

Sem	Sub. Code	Title of the Paper	Teaching Hours/ Week	Duration of exam (hrs)	Marks Allotted			Credits
					C.A	S.E	Total	
1	18MC11	Mathematical Foundation of Computer Application	5	3	25	75	100	4
	18MC12	Digital Principles & Computer Organization	5	3	25	75	100	5
	18MC13	Programming in C	5	3	25	75	100	5
	18MC14	Relational Database Management Systems	5	3	25	75	100	5
	18MC11P	Programming in C Lab	5	3	40	60	100	3
	18MC12P	RDBMS Lab	5	3	40	60	100	3
2	18MC21	Object Oriented Programming using C++	5	3	25	75	100	4
	18MC22	Data Structures and Algorithms	5	3	25	75	100	5
	18MC23	Operating Systems	5	3	25	75	100	5
	18MC24	Computer Graphics & Multimedia	5	3	25	75	100	5
	18MC21P	Data Structures & Algorithms using C++ Lab	5	3	40	60	100	3
	18MC22P	Computer Graphics & Multimedia Lab	5	3	40	60	100	3
3	18MC31	Optimization Techniques	5	3	25	75	100	5
	18MC32	Programming in Java	5	3	25	75	100	5
	18MC33	Data Communications and Networking	5	3	25	75	100	5

Annexure – 25

3	18MC34	Software Engineering	5	3	25	75	100	5
	18MC31P	Programming in Java Lab	5	3	40	60	100	3
	18MC32P	Linux Programming Lab	5	3	40	60	100	3
4	18MC41	Open Source Technology	5	3	25	75	100	5
	18MC42	Mobile Computing	5	3	25	75	100	5
	18MC43	Principles of Compiler Design	5	3	25	75	100	5
		Elective – I	5	3	25	75	100	5
	18MC41P	Open Source Technology Lab	5	3	40	60	100	3
	18MC42P	Mobile Computing Lab	5	3	40	60	100	3
5	18MC51	Web Technologies	5	3	25	75	100	5
	18MC52	Cryptography & Network Security	5	3	25	75	100	5
	18MC53	Data Mining & Data Warehousing	5	3	25	75	100	5
		Elective –II	5	3	25	75	100	5
	18MC51P	Web Technology Lab	5	3	40	60	100	3
	18MC52P	Data Mining & Data Warehousing Lab using Open Source Tools	5	3	40	60	100	3
6	18MCPR6	Project – Viva Voce	-	Viva	100	100	200	12
Total			150					140

Electives:

Semester IV

Elective – I (Choose any One)

1. Cloud Computing - 18MCE4A
2. Soft Computing - 18MCE4B
3. Enterprise Resource Planning - 18MCE4C

Semester V

Elective – II (Choose any One)

1. Big Data Analytics - 18MCE5A
2. Digital Image Processing - 18MCE5B
3. Internet Of Things - 18MCE5C

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M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Optimization Techniques
Semester : III **Contact Hours : 5**
Sub Code : 18MC31 **Credits : 5**

Objective:

With the present development of the computer technology, it is necessary to develop knowledge for solving problems in science and technology. It will be very useful for the students in constructing analytical methods.

Unit – I

Linear Programming Problem: Linear Programming Problem - Mathematical Formulation of the Problem – Graphical Solution Method – The Computational Procedure – Use of Artificial Variables(Big-M method only).

Unit - II

Transportation and Assignment Problems: The Transportation Table – Finding an Initial Basic Feasible Solution – Test for Optimality – Economic Interpretation of u_j's and v_j's – Stepping Stone Solution Method-- Mathematical Formulation of the Problem - Solution Methods of Assignment Problem – Special cases in Assignment Problems- The Travelling Salesman Problem.

Unit - III

Games and Strategies : Two-- Person Zero-- Sum Games – Games Without Saddle Points – Mixed Strategies-- Graphic solution of 2 x n and m x 2 Games – Dominance Property .

Unit - IV

Network Scheduling by PERT./ CPM : Introduction - Network **:** Basic Components - Logical Sequencing - Rules of Network Construction - Concurrent Activities - Critical Path Analysis – Probability Considerations in PERT.

Unit - V

Queuing Theory: Queuing System – Elements of a Queuing System – Operating Characteristics of a Queuing System – Probability Distribution in Queuing Systems – Poisson Queuing System (M / M /1) : (F1FO / ∞ // ∞), (M / M / 1) : (FIFO / N / ∞) .

Text Book :

Kantiswarup, P.K.Gupta and Manmohan, Operations *Research* , S.Chand & Company Ltd, 16th Edition, 2014.

Chapters:

Unit - I : 2.2 , 2.3,3.2 , 4.3, 4.4

Unit - II : 10.5, 10.9, 10.10, 10.11, 10.14, 11.2, 11.3, 11.4,11.7

Unit - III : 17.2, 17.5, 17.6, 17.7

Unit - IV : 25.1 , 25.2 , 25.3 , 25.4 , 25.5 , 25.6 , 25.7

Unit - V : 21.2, 21.3, 21.4, 21.6, 21.9(Model I, Model III)

Reference Books:

1. A.M. Natarajan , P.Balasubramani and A.Tamilarasi , *Operations Research , Pearson Education* , 2nd Edition , 2005
2. Prem Kumar Gupta and D.S.Hira, *Operations Research* , S.Chand & Company Ltd , 3rd Edition , 2003
3. J.K.Sharma, *Operations Research Theory & Applications* , S.Chand & Company Ltd , 3rd Edition , 2003.
4. Taha H.A, *Operation Research: An Introduction* ,7th Edition , Pearson Education, 2nd Edition , 2004
5. Kanti Swarup , P.K.Gupta , Manmohan , *Operation Research* , 3rd Edition , 2011.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Programming in Java
Semester : III **Contact Hours : 5**
Sub Code : 18MC32 **Credits : 5**

Objective:

To imbibe knowledge about Java Language to develop an application program in Java**,** Exception handling, RMI, Swing.

Unit – I

Data Types , Variables and Arrays: Integers - Floating-Point Types – Characters – Booleans - Variables . **Operators :** Arithmetic Operators - The Bitwise Operators - Relational Operators - Boolean Logical Operators. **Control Statements**: Java's Selection Statements - Iteration Statements - Jump Statements . **Introducing Classes**: Class Fundamentals - Declaring Objects - Introducing Methods - Constructors.

Unit - II

Inheritance: Inheritance Basics - Using Super - Creating a Multi Level Hierarchy . **Packages and Interfaces:** Packages - Access Protection - Importing Packages - Interfaces . **Exception Handling :** Exception Handling Fundamentals - Exception Types - Uncaught Exceptions - Using try And catch - Multiple catch Clauses - Nested try Statements .

Unit– III

Multithreaded Programming: The Java Thread Model – The Main Thread – Creating a Thread – Creating Multiple Threads - Thread Priorities – Synchronization – Interthread Communication .**Input /Output: Exploring java.io:** File

– The Stream Classes – The Byte Streams – The Character Streams. **The Applet Class:** Applet Basics - Applet Architecture - An Applet Skeleton - Simple Applet Display Methods - The HTML APPLET Tag.

Unit – IV

Event Handling: The Delegation Event Model – Event Classes – Sources of Events – Event Listener Interfaces **. Introducing the AWT:Working With Windows , Graphics and Text :** AWT Classes - Window Fundamentals – Introducing Graphics - Working with Color **. Using AWT Controls, Layout Managers and Menus :** Labels - Using Buttons – Applying Check Boxes - Using Lists - Using a TextField - Using a TextArea – Understanding Layout Managers.

Unit – V

Introducing GUI Programming with Swing : **Introducing Swing :** Components and Containers - The Swing Packages - A Simple Swing Application. **Exploring Swing** : JLabel and ImageIcon – JtextField - The Swing Buttons - JTabbedPane – JScrollPane – Jlist - JComboBox – Trees - JTable. **Networking :** Networking Basics - The Networking Classes and Interfaces - InetAddress - Inet4Address and Inet6Address - TCP/IP Client Sockets - URL - URL Connection - HttpURL Connection - The URL Class - Cookies - TCP / IP Server Sockets - Datagrams.

Text Book :

Herbert Schildt , *The Complete Reference - Java*^{TM} , Tata McGraw Hill , 9th Edition , 2014.

Chapters:

Unit - I : 3 , 4 , 5 , 6

Unit - II : 8 , 9 , 10

Unit - III : 11, 20 , 23

Unit – IV : 24 , 25 , 26

Unit - V : 31 , 32 , 22

Reference Books:

1. Herb Schildt , *Java Programming Cookbook* , Tata McGraw Hill , 1st Edition , 2008
2. Ken Arnold , David Holmes , *The Java Programming Language* , Pearson Education , 3rd Edition , 2008
3. E. Balagurusamy, Programming with Java , a Primer , 3rd edition, 2009
4. Hari Mohan Pandey , *Java Programming* , Pearson , 1st Edition , 2012.
5. Laura Lemay and Rogers Cadenhead , *Sams Teach Yourself Java 2* , Sams TechMedi, 1st Edition , 2000.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Data Communications and Networking
Semester : III **Contact Hours : 5**
Sub Code : 18MC33 **Credits : 5**

Objective:

To acquire knowledge about Transmission Media , LAN , ISDN , ATM , Transport Layer concept.

Unit – I

Introduction : Data Communications – Networks – Networks Types –Standards and Administration. **Network Models :** TCP/IP Protocol Suite – The OSI Model.

Unit – II

Bandwidth Utilization: Multiplexing and Spectrum Spreading: Multiplexing. **Transmission Media** : Guided Media - UnGuided Media : Wireless . **Switching** : Circuit-Switched Networks – Packet Switching .

Unit – III

Error Detection and Correction: Introduction - Block Coding - Cyclic Codes - Checksum. **Wired LANs: Ethernet:** Ethernet Protocol. **Other Wireless Networks :** Cellular Telephony - Satellite Networks.

Unit – IV

Network Layer: Introduction to Network Layer : Network-Layer Services – Network Layer Performance – IPV4 Addresses : – Address Space – Classful Addressing – Classless Addressing .**Unicast Routing :** Routing Algorithms , Unicast Routing Protocols **:-** Routing Information Protocol(RIP) . **Multicast Routing :** Multicasting Basics.

Unit – V

Transport Layer : Introduction to Transport Layer : Introduction – Transport –Layer Protocols. **Transport–Layer Protocols** : User Datagram Protocol - , Transmission Control Protocol : – TCP Services , TCP Features – Segment – A TCP Connection – Flow Control – Error Control . **Standard Client-Server Protocols :** Domain Name System(DNS) **.**

Text Book :

Behrouz A. Forouzan , *Data Communications and Networking* , Mc-Graw Hill , 5th Edition , 2013.

Chapters:

Unit - I : 1.1 – 1.3 , 1.5 , 2.2 , 2.3

Unit – II : 6.1 , 7 .2 , 7.3 , 8.2 , 8.3

Unit - III : 10.1 – 10.4 , 13.1 , 16.2 , 16.3

Unit - IV : 18.1 , 18.3 ,18.4 - 18.4.1, 18.4.2, 18.4.3, 20.2 , 20.3 - 20.3.2, 21.2

Unit – V : 23.1 , 23.2 , 24.2 , 24.3-24.3.1 , 24.3.2 , 24.3.3 , 24.3.4 , 24.3.7 , 24.3.8 , 26.6

Reference Books:

1.Achyut s Godbole , Atul Kahate , *Data Communications And Networks* , Tata McGraw Hill , 2nd Edition , 2013.

2. Andrew S. Tanenbam , *Computer Network* , PHI , 5th Edition , 2013.

3. Kurose James F. Ross Keith W. *Computer Networking: A Top-Down Approach,* Pearson Education; 6th Edition , 2017

4. William Stallings, Data and Computer Communications , Person , 8th n Edition,2007

5. Bhushan trivedi **,** *Data communications and networks* ,Oxford University Press , Edition 2016.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Software Engineering
Semester : III **Contact Hours : 5**
Sub Code : 18MC34 **Credits : 5**

Objective:

To be aware of different life cycle Models, Analysis, Design, Implementation, Testing , SCM and Quality Assurance.

Unit – I

Software Engineering: Software Engineering – A Layered Technology- **A Process Models** -A Generic Process Model – Process Assessment and Improvement - Prescriptive Process Models **-** Specialized Process Models – The Unifies Process Model- Personal and Team Process Models – Process Technology- Product and Process –**Agile Development –** What is Agility–Agility and the cost of change- What is an Agile Process - Extreme programming(XP) – Other Agile Process Models .

Unit – II

Estimation: Observation on Estimation - Empirical Estimation Models. **Project Scheduling:** Basic Concepts – Project Scheduling. **Risk Management**: Reactive Vs. Proactive Risk Strategies **-** Software Risks – Risk Identification – Risk Projection – Risk Refinement. **Principles that Guide Practice –** Software engineering Knowledge - Core Principles – Principles That Guide Each Framework Activity.

Unit – III

Understanding Requirements: Requirements Engineering – Establishing the Ground work – Eliciting Requirements – Developing Use Cases – Building the

Requirements Model. – Negotiating Requirements- Validating Requirements - **Design Concepts :** Design within the Context Of Software Engineering - The Design Process - Design Concepts – The Design Model - **Architectural Design:** Software Architecture- Architectural Genres – Architectural Styles- Architectural Design – Assessing Alternative Architectural Design – Architectural Mapping Using Data Flow.

Unit – IV

Software Testing Strategies: A Strategic Approach To Software Testing – Strategic Issues - Test Strategies For Conventional Software - Test Strategies for Object-Oriented Software –Test Strategies for WebApps - Validation Testing - System Testing - The Art Of Debugging. **Testing Conventional Applications:** Software Testing Fundamentals - Internal and External Views of Testing - White Box Testing - Basis Path Testing - Control Structure Testing - Black Box Testing – Model Based Testing.

Unit – V

Quality Concepts- What is Quality – Software Quality **- Software Quality Assurance** – Background Issues – Elements of Software Quality Assurance - SQA Tasks , Goals and Metrics - Formal Approach To SQA - Statistical Software Quality Assurance – Software Reliability – The ISO 9000 Quality Standards –The SQA Plan. **Software Configuration Management** - Software Configuration Management- The SCM Repository - The SCM Process.

Text Book:

Roger S. Pressman., *Software Engineering : A Practitioner's Approach* , McGraw Hill (India) Edition , 7th Edition , 2014

Chapters:

Unit - I :1.3, 2.1 to 2.8, 3.1 to 3.5

Unit - II : 26.1, 26.7, 27.1, 27.2, 28.1 to 28.5, 4.1, 4.2, 4.3.

Unit - III : 5.1- 5.7, 8.1 to 8.4, 9.1 to 9.6

Unit - IV : 17.1 to 17.8, 18.1 to 18.7

Unit - V : 14.1 to 14.2 , 16.1 to 16.8, 22.1 to 22.3

Reference Books:

1.Aggarwal K K & Yogesh Singh , *Software Engineering*, *New Age International*, New Delhi, 2nd Edition, 2005.

2. Ian Sommerville, *Software Engineering*, Pearson Education , 6th Edition , 2000.

3. James Peters F & Witold Pedryez , *Software Engineering – An Engineering Approach*, John Wiley and Sons , 2nd Edition , 2000.

4. Pankaj Jalote, *An Integrated Approach to Software Engineering ,* Springer Verlag, 3rd Edition, reprint 2005.

5. Rajib Mall, Fundamentals of Software Engineering –PHI Learning private limited, 5th Edition,2014.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Programming in Java Lab
Semester : III **Contact Hours : 5**
Sub Code : 18MC31P **Credits : 3**

Program List :

I Basic Programs

1)Write java program to print Biggest of 3 Numbers using Logical Operators

2) Write a java program to print first 10 numbers in fibonacci series

3) Write a java program to print Factorial of a given number

4) Write a java program to print the names in sorted order using arrays

5) Write a java program to print multiplication table using arrays

II Method Overloading

1)Write a java program to demonstrate method overloading

III Constructor overloading :

1) Write a java program to illustrate the concept of constructors and its overloading.

2) Write a java program for Rectangle class using constructor overloading with different no. of parameter list.

IV Inheritence

1) Write a java program for Rectangle class using Simple Inheritance

2) Write a Java program to demonstrate multilevel inheritance.

V Method Overriding

1)Write a java program for Bank class using Method Overriding.

2) Write a java program to demonstrate Method overriding (use super keyword)

VI Packages:

1) Write a Java program to demonstrate use of user defined packages.

2) Write a java package for book class and then import and display the result.

3) Write a java program to find the cube of a number for various data types using package and then import and display the results.

VII Interfaces:

1) Write a Java program to illustrate the multiple inheritance by using Interfaces.

VIII Exception handling:

1)Write a java program to demonstrate simple example for exception handling

2)Write a java program to demonstrate exception handling with multiple catch blocks

3) Write a java program using NumberFormat exception

IX File I/O and Streams

1)Write a java program to Demonstration of FileOutputStream and PrintStream classes

2) Write a java program to Write bytes to a file

3) Write a java program to copy bytes from one file to another.

X Applets

1) Write a java program for Sum of Two Numbers using Applet

2) Write a java program for Applet using drawstring(), drawRect() and drawOval()

3) Write a Java program to demonstrate banner applet.

XI AWT

1)Write a java program that prints a message by clicking on the button using AWT

2) Write a java program to demonstrate Grid Layout manager using AWT

3) GUI with controls menus and event handling using SWING

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Linux Programming Lab
Semester : III **Contact Hours : 5**
Sub Code : 18MC32P **Credits : 3**

Program List:

1. Write a Shell script that accepts a filename, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a Shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. Write a Shell script that displays list of all the files in the current directory to which the user has read, Write and execute permissions.
4. Write a Shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
5. Write a Shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
6. Write a Shell script to list all of the directory files in a directory
7. Write a Shell script to find factorial of a given integer.
8. Write a Shell script to count the number of lines in a file that do not contain vowels
9. Write a Shell script to perform operations using system calls.
10. Write an awk script to find the number of characters, words and lines in a file.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Open Source Technology
Semester : IV **Contact Hours : 5**
Sub Code : 18MC41 **Credits : 5**

Objective:

To acquire knowledge about PHP and to implement it to develop Web Applications.

Unit – I

What is PHP – What is MySQL – Deciding on a Web Application Platform .**Server-Side Scripting Overview :** Static HTML – Client-Side Technologies – Server-Side Scripting . **Learning PHP Syntax and Variables :** PHP Syntax Is C-Like – Comments – Variables – Types in PHP – The Simple Types – Doubles – Booleans – NULL – Strings – Output .

Unit – II

Learning PHP Control Structures and Functions : Boolean Expressions – Branching – Looping – Using Functions – Function Documentation – Own Functions – Functions and variable Scope – Function Scope . **PHP String Handling :** Strings in PHP - String Functions .

Unit - III

Learning Arrays : The Uses of Arrays – Creating Arrays – Retrieving Values – Multidimensional Arrays – Inspecting Arrays – Deleting from Arrays – Iteration

Learning PHP Number Handling : Numerical Types – Mathematical Operators – Simple Mathematical Functions .

Unit – IV

Introducing Databases And MySQL : What is a Database – Why a Database - PHP-Supported Databases .**Learning Structured Query Language (SQL) :** Relational Databases and SQL – SQL Standards – THE Workhorse of SQL – Database Design – Privileges Security. Learning **Database Administration and Design :** MySQL Client Commands – MySQL User Administration – Backups – Replication – Recovery .

Unit – V

Performing Database Queries : HTML Tables and Database Tables – Complex Mappings – Creating sample Tables . **Integrating Web Forms and Databases :** HTML Forms – Basic Form Submission to a Database – Editing Data with an HTML Form . **Improving Database Efficiency :** Connections – Indexing and Table Design .

Text Book :

Steve Suehring , Tim Converse and Joyce Park , *PHP6 and MySQL* , Wiley Publishers , 3rd Edition , 2014 .

Chapters:

Unit - I : 1 , 2 , 4

Unit - II : 5 , 7

Unit - III : 8 , 9

Unit - IV : 11 , 13 , 14

Unit - V : 16 , 17 , 18

Reference Books:

1. Steven Holzner , *The Complete Reference PHP*, Tata McGraw-Hill , 3rd Edition, 2012.
2. Luke Welling , Laura Thomson , *PHP and My SQL Web Development* , Pearson , 4th Edition.2009
3. Elliott White III , Jonathan D.Eisenhamer , *PHP 5 in Practice* , Pearson , 2nd Edition 2008.
4. Apache , *Beginning PHP6 MySQL Web Development* , Wiley , 2nd Edition , 2014.
5. W.Jason Gilmore , *Beginning PHP and MySQL* , Dreamtech Press ,1st Edition , 2008

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Mobile Computing
Semester : IV **Contact Hours : 5**
Sub Code : 18MC42 **Credits : 5**

Objective:

To imbibe knowledge on Mobile Communication and its Architecture and concerned Protocols, telecommunication system, wireless LAN , Android.

Unit - I

Introduction: Applications - A short history of wireless communication - Some open research topics - A simplified reference model. **Wireless Transmission:** Frequencies for radio transmission – Signals – Antennas– Multiplexing.

Unit - II

Telecommunication Systems: GSM - Mobile services – System architecture – Radio interface – DECT - System architecture – Protocol architecture – TETRA . **Satellite Systems:** History – Applications – Basics - : GEO 173 – LEO 174 – MEO 175 – Routing – Localization - Handover.

Unit - III

Wireless LAN: IEEE 802.11 – System architecture- Protocol architecture- Physical layer – Medium access control layer – MAC management - HIPERLAN – Historical : HIPERLAN 1- WATM - BRAN- HiperLAN2- Bluetooth - User scenarios – Architecture – Radio layer – Baseband layer – Link manager protocol.

Unit - IV

Mobile Network Layer: Mobile ad-hoc networks – Routing – Destination sequence distance vector – Dynamic source routing – Alternative metrics - Overview ad-hoc routing protocols. **Support for Mobility**: Wireless application protocol (version 1.x)-

Architecture – Wireless datagram protocol – Wireless transport layer security – Wireless transaction protocol – Wireless session protocol- Wireless application environment – Wireless markup language – WMLScript – Wireless telephony application – Push architecture

Unit - V

Getting Started with Android programming: What is Android? – Obtaining the Required Tools – Creating Your First Android Application – Anatomy of an Android Application. **Activities, Fragments, and Intents**: Understanding Activities – Linking Activities Using Intents – Fragments – Calling Built- In Applications Using Intents – Displaying Notifications.

Text Books :

1. Jochen Schiller, *Mobile Communications* , Pearson Education , 2nd Edition , 2014.

Chapters:

Unit - I : 1.1, 1.2, 1.4 , 1.5 , 2.1, 2.2, 2.3, 2.5

Unit - II : 4.1.1 to 4.1.3 , 4.2, 4.3, 5.1 to 5.6.

Unit - III : 7.3.1 to 7.3.5 , 7.4, 7.5.1 to 7.5.5

Unit - IV : 8.3, 10.3.1 to 10.3.10

2. Wei-Meng Lee , *Beginning Android 4 Application Development* , Wiley India Edition , 2014 .

Chapters:

Unit - V : 1, 2

Reference Books:

1. Raj Kamal, *Mobile Computing* , Oxford University Press , 2nd Edition , 2012
2. Rajesh Kumar Maurya, *Mobile Computing* , Global Academic Publishers & Distributors , 1st Edition , 2012.
3. Asoke K. Talukder, Hasan Ahmed , Roopa R. Yavagal , *Mobile Computing Technology , Applications and Service Creation* , Tata McGraw Hill Education Private Ltd, 2nd Edition , 2010.
4. Wallace Jackson, *Android Apps for Absolute Beginners* , Apress , Springer India Private Ltd , 2nd Edition , 2012
5. Prasanna Kumar Dixit, *Android* , Vikas Publishing House Private Ltd., 1st Edition , 2014

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M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Principles of Compiler Design
Semester : IV **Contact Hours : 5**
Sub Code : 18MC43 **Credits : 5**

Objective:

To acquire knowledge about Compilers, Lexical Analysis, Basic parsing techniques , Syntax directed translation, Error detection and recovery.

Unit – I

Introduction: Language Processors – The Structure of a Compiler – The Evolution of Programming Languages - Impacts on Compilers– The Science of Building a Compiler. **A Simple Syntax-Directed Translator:** Introduction – Syntax Definition – Definition of Grammars- Derivations - Parse Trees—Syntax-Directed Translation – Postfix Notation- Parsing – Top-Down Parsing - Predictive Parsing - Left Recursion.

Unit- II

Lexical Analysis: The Role of the Lexical Analyzer—Input Buffering: Specification of Tokens—Strings and Languages—Operations on Languages – Regular Expressions—Recognition of Tokens – Transition Diagrams –Recognition of Reserved Words and Identifiers –Completion of the Running Example - Finite Automata – From Regular Expressions to Automata- Conversion of an NFA to a DFA.

Unit – III

Syntax Analysis: Introduction – Context-Free Grammars- The Formal Definition of a Context-Free Grammar – Notational Convertions – Derivations- Parse Trees and Derivations – Writing a Grammar- Eliminating Ambiguity - Elimination of Left Recursion – Left Factoring - Top-down Parsing: - Recursive-Descent Parsing – FIRST and FOLLOW - LL(1) Grammars – Nonrecursive Predictive Parsing – Bottom-Up Parsing - Reductions- Handle Pruning – Shift –Reduce Parsing- Introduction to LR Parsing - Simple LR - Why LR Parsers? - Items and the LR(0) Automation .

Unit - IV

Syntax-Directed Translation : Syntax–Directed Definitions – Inherited and Synthesized Attributes Evaluation Orders for SDD's – Dependency Graphs - Syntax-Directed Translation Schemes - Postfix Translation Schemes - Parser- Stack Implementation of Postfix SDT's – SDT's With Actions Inside Productions– **Intermediate-Code Generation**: Variants of Syntax Trees - Three–Address Code - Addresses and Instructions – Quadruples - Triples.

Unit – V

Code Generation: Issues in the Design of a Code Generator – Basic Blocks and Flow Graphs–Optimization of Basic Blocks – The DAG Representation of Basic Blocks – Finding Local Common Subexpressions—A Simple Code Generator - Register and Address Descriptors - The Code-Generation Algorithm - Peephole Optimization. **Machine-Independent Optimizations:** The Principal Sources of Optimization - Causes of Redundancy – A Running Example: Quicksort – Semantics - Preserving Transformations – Global Common subexpressions – Code Motion – Induction Variables and Reduction in Strength.

Text Book :

Alfred V. Aho , Monica S.Lam, Ravi Sethi,Jeffrey D. Ullman , Compilers *Principles, Techniques and Tools* , Pearson Education , 2nd Edition , 2018

Chapters:

Unit - I : 1.1, 1.2, 1.3.2, 1.4, 2.1, 2.2.1 to 2.2.3, 2.3.1, 2.4.1, 2.4.2, 2.4.5

Unit – II : 3.1, 3.2, 3.3.1 to 3.3.3, 3.4.1, 3.4.2, 3.4.3 , 3.6, 3.7.1

Unit - III : 4.1, 4.2.1 to 4.2.4, 4.3.2 to 4.3.4, 4.4.1 to 4.4.4, 4.5.1 to 4.5.3, 4.6.1, 4.6.2

Unit – IV : 5.1.1, 5.2.1 , 5.4.1 to 5.4.3, 6.1, 6.2.1, 6.2.2, 6.2.3

Unit - V : 8.1, 8.4, 8.5.1, 8.5.2, 8.6.1, 8.6.2, 8.7, 9.1.1 to 9.1.4, 9.1.7, 9.1.8.

Reference Books:

1.Alfred V.Aho , Ravi sethi Jeffrey D.Ullman , *Compilers Principles , Techniques and Tools* , Pearson Education , 3rd Edition , 2004.

2. D.Chithra , *Principles of Compiler Design* , CBS , 2nd Edition , 2011.

3. Alfred V.Aho , Ravi Sethi Jeffrey D.Ullman , *Compilers Principles , Techniques and Tools* , Darling Kindersley (India) , 1st Edition , 2007.

4. Sandeep Saxena and Rajkumar Singh Rathore , *Compiler Design* , S.Chand and Co Ltd. , 2nd Edition , 2013.

5.R. Venkatesh, N.Uma Maheshwari, S. Jeyanthi, C*mpiler Design* , Yes Dee Publishing House , 2015.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)
ELECTIVE - I

Title of the Paper : Cloud Computing
Semester : IV **Contact Hours : 5**
Sub Code : 18MCE4A **Credits : 5**

Objective:

The benefits of cloud computing are being recognized in businesses and institutions. The immediate benefits of cloud computing are obvious: cloud-based applications reduce infrastructure and IT costs, increase accessibility, enable collaboration, and allow organizations more flexibility in customizing their products both for their brand and for their audience.

Unit – I

Era of Cloud Computing : Getting to know the Cloud – Components of Cloud Computing – Cloud Types –Private , Public and Hybrid , Cloud Computing Service Delivery Models .**Cloud Computing Services –** Infrastructure as a Service(IaaS) – Platform as a Service(PaaS) – Leveraging PaaS for Productivity – Software as a Service(SaaS) – Database as a Service(DBaaS) – Specialized Cloud Services. **Cloud Types and Models** – Private Cloud –Components of a Private Cloud – Community Cloud – Public Cloud – Public Cloud – Hybrid Clouds. Cloud Deployment Techniques – Cloud Network Topologies – Automation for Cloud Deployments – Self-Service Features in a Cloud Deployment – Federated Cloud Deployments – Cloud Performance – Impact of Memory on Cloud Performance – Improving Cloud Database Performance .

Unit – II

Cloud Computing and Business Value : Key Drivers for Cloud Computing – Cloud Computing and Outsourcing – Types of Scalability – Distribution over the

Internet. **Demsystifying Cloud Computing :** Myths and Truths . **Recent Trends in Cloud Computing and Standards :** Recent Trends in – Conflict of Interest for Public Cloud and IT Product Providers – Cloud Compliance – BYOD and Encryption Exposures – Cloud Standards – Cloud Ratings – Cloud Computing Trends that are Accelerating Adoption . **Data Security in the Cloud :** Challenges with Cloud Data - Challenges with Data Security – Data Confidentiality and Encryption – Data Availability – Data Integrity – Cloud Data Management Interface – Cloud Storage Gateways(CSGs) – Cloud Firewall – Virtual Firewall.

Unit – III

Application Architecture for Cloud : Cloud Application Requirements – Architecture for Traditional Versus Cloud Applications – Fundamental Requirements for Cloud Application Architecture – Use of Client-Server Architecture for Cloud Applications – Addressing Cloud Application Performance and Scalability –Service Oriented Architecture (SOA) for Cloud Applications – Parallelization within Cloud Applications. **Cloud Programming :** Programming Support for Google Apps Engine – Programming Support for Amazon EC2. **Migrating Applications to the Cloud :** Cloud Migration Techniques – Phase during Migration of an Application to the cloud – Cloud emulators and its use for Application Testing and Migration.

Unit – IV

SLA with Cloud Service Providers : The Concept of an SLA , SLA aspects and requirements – Service Availability – Cloud Outages – Credit Calculation for SLA Breaches – Sample SLA . **Introducing Virtualization :** Introducing Virtualization and its benefits – Implementation Levels of Virtualization – Virtualization at the OS Level – Virtualization Structure – Virtualization Mechanisms – Open Source Virtualization Technology – Xen Virtualization Architecture - Binary Translation with full Virtualization – Paravirtualization with Compiler Support – Virtualization of CPU , Memory and I/O Devices , Hardware Support for Virtualization in Intex x86 Processor – Virtualization in Multicore Processors .

Unit – V

Application Development for Cloud : Developing On-Premise Versus Cloud Applications – Modifying Traditional Application for Deployment in the Cloud – Stages during the Development Process of Cloud Application – Managing a Cloud Application – Using Agile Software Development for Cloud Applications – Static Code Analysis for Cloud Applications – Developing Synchronous and Asynchronous Cloud Applications. **Application Security in the Cloud :** Cloud Application Software Development Lifecycle(SDLC) – Cloud Service Reports by Providers – Application Security in an IaaS Environment - Application Security in an PaaS Environment - Application Security in an SaaS Environment .**Mobile Cloud Computing :** Definition of Mobile Cloud Computing – Architecture of Mobile Cloud Computing – Benefits of Mobile Cloud Computing - Mobile Cloud Computing Challenges .

Text Book:

Kailash Jayawal , Jagannath Kallakurchi , Donald J.Houde , Dr. Deven Shah, *Cloud Computing Black Book* , Dreamtech Press , 2014 Edition .

Chapters:

Unit - I **:** 1, 3 , 6 , 8

Unit - II **:** 4 , 5 , 9 , 10

Unit - III **:** 12 , 13 , 16

Unit - IV **:** 18 , 2

Unit - V **:** 24 , 25 , 27

Reference Books:

1. Thomas Fri, Ricardo Puttini, Zaigham Mahmood, *Cloud Computing: Concepts, Technology & Architecture*, PHI ,2013
2. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter , *Cloud Computing "A Practical Approach" Cloud Computing "A Practical Approach",* McGraw-Hill Education Pvt Ltd, 2009.
3. Arshdeep Dahga , Vijay Madisetti , *Cloud Computing A Hands – on Approach,* Universities Press , Reprint 2016
4., Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, Elsevier, *Distributed and Cloud Computing From Parallel Processing to the Internet of Things* , 2012.
5. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, *Cloud Computing: Principles and Paradigms*, Wiley Publishing , 2011.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

ELECTIVE - I

Title of the Paper : Soft Computing
Semester : IV **Contact Hours : 5**
Sub Code : 18MCE4B **Credits : 5**

Objective:

To acquire knowledge in Neural Networks, Fuzzy Networks , feed forward network , associative memory, counter propagation and SOM.

Unit –I

Introduction : Hard Computing – Soft Computing – Hybrid Computing . **Optimization and Some Traditional Methods :** Introduction to Optimization – Traditional Methods of Optimization .

Unit – II

Introduction to Genetic Algorithms : Working Cycle of a Genetic Algorithm – Binary-Coded GA . GA – parameters Setting – Constraints Handling in GA – Advantages and Disadvantages of Genetic Algorithms – Combination of Local and Global Optimum Search Algorithms . **Some Specialized Genetic Algorithm :** Real-Coded GA – Micro-GA – Visualized Interactive GA – Scheduling GA .

Unit – III

Introduction to Fuzzy Sets : Crisp Sets – Fuzzy Sets – Measures of Fuzziness and Inaccuracy of Fuzzy Sets . **Fuzzy Reasoning and Clustering :** Fuzzy Logic Controller – Fuzzy Clustering.

Unit – IV

Fundamentals of Neural Networks : Introduction – Static vs. Dynamic Neural Networks - Training of Neural Networks .**Some Examples of Neural Networks :** Multi-Layer Feed-Forward Neural Network(MLFFNN) – Radial Basis Function Network(RBFN) – Self-Organization Map(SOM) – Counter-Propagation Neural Network(CPNN) – Recurrent Neural Networks (RNNs).

Unit – V

Combined Genetic Algorithms : Fuzzy Logic : Fuzzy-Genetic Algorithm – Genetic-Fuzzy System . **Combined Genetic Algorithms : Neural Networks :** Working Principle of a Genetic - Neural System . **Applications of Soft Computing :** Applications of soft computing in Design and Development of Intelligent Autonomous Robots – Applications of Soft Computing in Data Analysis .

Text Book:

Dilip K.Pratihar , *Soft Computing Fundamentals and Applications* , Narosa Publishing House , Revised Edition , 2015.

Chapters:

Unit I : 1 , 2

Unit II : 3 , 4

Unit III : 7 , 8

Unit IV : 9 , 10

Unit V : 11, 12 , 14

Reference Books:

1. Laurene Fausett , *Fundamentals of Neural Networks* , Pearson, 8th Edition , 2012.
2. Timothy J.Ross, *Fuzzy Logic with Engineering Applications* , Wiley Publisher, 3rd Edition , 2011.
3. Samir Roy , *Introduction to Soft Computing* , Pearson Education , 1st Edition , 2013.
4. Sushil Kumar Singh , *Soft Computing : Neural Networks , Fuzzy Logic and Genetic Algorithms* , Galgotia ,1st Edition , 2012.
5. S.N.Sivanandam and S.N.Deepa , *Principles of Soft Computing* , Wiley Publisher, 2nd Edition , 2011.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

ELECTIVE - I

Title of the Paper : Enterprise Resource Planning
Semester : IV **Contact Hours : 5**
Sub Code : 18MCE4C **Credits : 5**

Objective:

To obtain knowledge about Advanced Technology in ERP, ERP Security, Business Modeling and Architecture.

Unit - I

Introduction: Introduction to ERP – Basic ERP Concepts – Justifying ERP Investments - Benefits of ERP.

Unit - II

ERP and Related Technologies: ERP and Related Technologies - Advanced technology and ERP Security.

ERP Marketplace and Functional Modules: ERP Marketplace and Marketplace Dynamics – Business Modules of an ERP Package.

Unit - III

ERP Implementation: ERP Implementation Lifecycle - ERP Package Selection – ERP Transition Strategies .

Unit - IV

ERP Implementation: ERP Implementation Process –ERP Project Teams – Consultants, Vendors and Employees – Success and Failure factors of the ERP Implementation

Unit - V

ERP – Present and Future: ERP and E-Business – ERP, The Internet, and WWW-ERP II – Future Directions and Trends in ERP

Text Book:

Alexis Leon, ERP Demystified , Tata Mc-Graw Hill , 3nd Edition , 2014.

Chapters:

Unit - I	: 3, 4, 5, 7.
Unit - II	: 8, 9, 10, 11.
Unit - III	: 13, 14, 15
Unit - IV	: 17, 18, 19, 20.
Unit - V	: 23, 24, 25.

Reference Books:

1. Joseph Brady A., Ellen Monk F., Bret Wagner, *Concepts in Enterprise Resource Planning* , Thompson Course Technology , 1st Edition , 2001.
2. Vinod Kumar Garg and Venkitakrishnan N K, *Enterprise Resource Planning – Concepts and Practice* , PHI , 2nd Edition , 2003
3. Mary Sumner , *Enterprise Resource Planning* , Pearson Education , 9th Edition , 2012
4. Alexis Leon , *Enterprise Resource Planning* , Mc-Graw Hill Education ,2nd Edition , 2014.
5. Jaiswal , *Textbook of Enterprise Resource Planning* , Macmillan Publishers , 1st Edition , 2005.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Open Source Technology Lab
Semester : IV **Contact Hours : 5**
Sub Code : 18MC41P **Credits : 3**

Program list:

1. Program using String.
2. Program using PHP Time zone
3. Program using Sorting Array.
4. Program using Global Array
5. Program using Function.
6. Program for reading data in Web pages.
7. Program using browser handling Power.
8. Program using Oops concept.
9. Program using File.
10. Program using Form Validation.
11. Program using PHP XML Parser
12. Program using PHP Filter
13. Program using MySQL Database Creation.
14. Program using MySQL Database table
15. Program using Session , Cookies and FTP.
16. Program using Web application Security.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Mobile Computing Lab
Semester : IV **Contact Hours : 5**
Sub Code : 18MC42P **Credits : 3**

Program list:

1. Program for displaying Student information
2. Program for Displaying Messages
3. Program for primitive Shapes in Android
4. Program for developing an application that make use of Database
5. Program for implement an application that writes data to the SD card
6. Program for implement an application that creates an alert upon receiving a message
7. Program for simple calculator in Android
8. Program for implement an application that implements multithreading
9. Program for develop a native application that writes data to the SD card
10. Program for mobile application that creates alarm clock

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M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Web Technologies
Semester : V **Contact Hours : 5**
Sub Code : 18MC51 **Credits : 5**

Objectives:

To aim to create their own website in Internet, Network Programming , XML, Java Server Page , Servlet and EJB

Unit – I

Internet Principles: Introduction to internet – Client Server Models – Protocols – Internet IP Address – Domain Name – Internet Services – Electronic Mail – World Wide Web – Internet Security – Electronic Commerce – and Electronic Data Interchange.

Introduction to HTML: A Brief History – HTML Tags – HTML Documents – Header Section – Body Section – Headings – Link Documents using Anchor Tag – Formatting Characters – Font Tag – Images and Pictures – Listing – Tables in HTML - **Frames and Forms:** Frameset Definition – Frame Definition – Nested Framesets – HTML Forms – Elements of a Form

Unit – II

Elements of Java Script: Data Types – Variables – Operators – Conditional statements – Array Objects – Data Objects – String Object – **Objects and Events :** Documents Object Model – The Document Object – Image Object – Forms and Elements – Event Handling – Browser Objects – Submit Event and Data Validation – **User Input Processing:** ParsInt() Function – Parse Float() Function – Recursive Functions.

Unit - III

Server Side Script with JSP: Client Responsibilities – Server Responsibility - Introduction to JSP – JSP Architecture – JSP Servers – JSP Tags – Request Object – Response Object – **JSP with JDBC:** Creating ODBC Data Source Name – Introduction to JDBC – Prepared Statement Class – Telephone Directory with JDBC – A Simple Internet Banking Application.

Unit - IV

JAVA Servlet: Servlet Environment and Role – Protocol Support – HTML Support – Replacing CGI Scripts – Installing Servlets – Using Java Web Server – Servlet API – The Servlet Life Cycle – Welcome Servlet – Servlet Context – HTTP Support – HTML to Servlet Communication – **Foreign Exchange:** Architecture – User Interface Frame – Java Script Page for Validating Data in Frame – JSP Page – Structure of Database – Servlet Design.

Unit – V

Enterprise JavaBeans: The Big Picture: Introduction –Transaction Processors-Two-Tier , Client-Server Architecture - Three-Tier Architecture - Distributed Transaction Processing - EJB's Role. **EJB's Architecture:** Logical Architecture – Overview of EJB's Architecture – A High-Level View of an EJB Conversation – RMI Clients - CORBA Clients - Building and Deploying EJBs - Roles in EJB.

Text Books :

1. C.Xavier , *Web Technology* , New Age International (P) Limited , 2nd Edition, 2007

Chapters:

Unit - I : Chapters : 1, 2, 3.

Unit - II : Chapters : 4, 5, 6.

Unit - III : Chapters : 7,9.

Unit - IV : Chapters : 10,11.

2. Tom Valesky , *Enterprise JavaBeans* , Pearson Education , 7th Edition , 2007

Unit - V : Chapters :1, 2

Reference Books:

1. Achuyt S Godbole, Atul Kahate, *Web Technologies : TCP/IP to Internet Application Architectures* , Tata MCGraw Hill , 2nd Edition , 2005.
2. Dr. Vaka Murali Mohan , S. Pratap Singh , *The Modern Approach to Web Technologies* , Scirech Publication , 1st Edition , 2010
3. Chris Bates, *Web Programming* , John Wiley & Sons Ltd, 2nd Edition,, 2006
4. Raj Kamal , *Internet and Web Technologies* , Tata McGraw-Hill Publishing Ltd , 1st Edition , 2002.
5. Ivan Bayross , *Web Technologies Part II* , BPB Publications , 2nd Edition , 2007.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Cryptography & Network Security
Semester : V **Contact Hours : 5**
Sub Code : 18MC52 **Credits : 5**

Objectives:

To imbibe knowledge about security problems, Encryption, Decryption, Database and network security, communication and wireless network security.

Unit-1:

Classical Encryption Techniques: Symmetric Cipher Model - Substitution Techniques - Transposition techniques – Rotor machines – Stenography. **Block Ciphers and the Data Encryption Standard:** Traditional Block Cipher Structure - The Data Encryption Standard – A DES Example- The Strength of DES- Block Cipher Design Principles.

Unit-II:

Advanced Encryption Standard: Finite field Arithmetic – AES Structure – AES Transformation Functions. **Block Cipher Operation:** Multiple Encryption and Triple DES- Electronic Code Book – Cipher Block Chaining Mode – Cipher Feedback Mode - Output Feedback Mode – Counter Mode. **Pseudorandom Number Generation and Stream Ciphers:** Pseudorandom Number Generators – Stream Ciphers – RC4.

Unit-III:

Public-Key Cryptography and RSA: Principles of Public –Key Cryptosystems – The RSA Algorithm. **Other Public-Key Cryptosystems:** Diffie-Hellman Key Exchange

- Elgamal Cryptographic System – Elliptic curve Arithmetic. **Cryptographic Hash Functions:** Applications of Cryptographic Hash functions.

Unit-IV:

Message Authentication Codes: Message Authentication Requirements – Message Authentication Functions. **Digital Signature:** Digital Signature – NIST Digital Signature. **Key Management and Distribution:** Symmetric Key Distribution Using Symmetric Encryption - Symmetric Key Distribution Using Asymmetric Encryption – Distribution of Public Keys.

Unit-V:

Wireless Network Security: Wireless Security – Mobile Device Security. **Electronic Mail Security:** Pretty Good Privacy – Domain Keys identified mail. **IP Security:** IP Security Overview – IP Security Policy.

Text Book:

William Stallings, *Cryptography and Network Security*, Pearson Education 2014, 6th Edition.

Chapters:

Unit-I	**:** 1 (1 to 5), 2 (1 to 5)
Unit-II	**:** 4 (1 to 3), 5 (1 to 6), 6 (2, 4, 5)
Unit-III	**:** 8 (1 to 2), 9 (1 to 3), 10(1)
Unit-IV	**:** 11 (1 to 2), 12 (1,4), 13(1 to 3)
Unit-V	**:** 16 (1 to 2), 17 (1,3),18 (1 to 2)

Reference Books:

1. Charlie Kaufman, Radia Perlman and Mike Speciner, "*Network Security*", Prentice Hall of India, 2002.
2. Behrouz A. Ferouzan*, "Cryptography & Network Security"*, Tata Mc Graw Hill, 2007.
3. Man Young Rhee, "*Internet Security: Cryptographic Principles*", "Algorithms and Protocols", Wiley Publications, 2003.
4. Charles Pfleeger, "*Security in Computing*", 4th Edition, Prentice Hall of India, 2006.
5. Ulysess Black, "*Internet Security Protocols*", Pearson Education Asia, 2000.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Data Mining and Data Warehousing
Semester : V **Contact Hours : 5**
Sub Code : 18MC53 **Credits : 5**

Objectives:

To acquire knowledge about Data Mining ,Classification, Cluster analysis, Preprocessing , data mining trends , Data Warehousing in desired manner.

Unit - I

Introduction : Why Data Mining? - What is Data Mining? – What kinds of data can be mined? - What kinds of patterns can be mined? - Which technologies are used? – Which kinds of Applications are targeted? - Major issues in Data Mining . **Data Warehousing and Online Analytical Processing:** Data Warehouse: Basic Concepts - Data Warehouse Modeling: Data Cube and OLAP – Data Warehouse Design and Usage - Data Warehouse Implementation .

Unit - II

Data Preprocessing – Data Preprocessing: An overview - Data Cleaning - Data Integration - Data Reduction - Data Transformation and Data Discretization.

Unit - III

Classification: Basic Concepts: Basic Concepts - Decision Tree Induction – Bayes Classification Methods – Rule-Based Classification. **Classification:Advanced Methods**: Bayesian Belief Networks-Classification by Backpropagation – Support Vector Machines – Lazy Learners- Other Classification Methods.

Unit - IV

Cluster Analysis: Basic Concepts and Methods: Cluster Analysis-Partitioning Methods –Hierarchical Methods – Density-Based Methods- Grid-Based Methods. **Advanced Cluster Analysis:** Probabilistic Model-Based Clustering - Clustering High-Dimensional Data- Clustering Graph and Network Data – Clustering with Constraints.

Unit - V

Outlier Detection: Outliers and Outlier Analysis – Outlier Detection Methods. **Data Mining Trends and Research Frontiers**: Mining Complex Data Types- Other Methodologies of Data Mining-Data Mining Applications- Data Mining and Society-Data Mining Trends.

Text Book:

Jiawei Han and Micheline Kamber , Jian Pei , *Data Mining Concepts and Techniques* , Elsevier Publisher , 3rd Edition , 2011.

Chapters:

Unit - I : 1.1 to 1.7, 4.1 to 4.4

Unit - II : 3.1 to 3.5

Unit - III : 8.1 to 8.4, 9.1 to 9.3, 9.5,9.6

Unit - IV : 10.1 to 10.5, 11.1 to 11.4

Unit - V : 12.1, 12.2, 13.1 to 13.5

Reference Books:

1. S.Nagabhushana , *Data Warehousing OLAP and Data Mining* , New Age International Publishers , 1st Edition , 2006
2. Pieter Adriaans , Dolf Zantinge , *Data Mining* , Pearson Education , 1st Edition , 2007.
3. Arun K.Pujari, *Data Mining Techniques* , Universities press, 3rd Edition , 2013.
4. S.K. Mourya, Shalu Gupta, *Data Mining and Data warehousing* , Narosa Publishing House Private Ltd , 1st Edition , 2013.
5. Bharat Bhushan Agarwal , Sumit Prakash Tayal , *Data Mining and Data Warehousing* , University Science Press , 1st Edition , 2009.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Big Data Analytics
Semester : V **Contact Hours : 5**
Sub Code : 18MCE5A **Credits : 5**

Objectives:

A comprehensive end-to-end guide that gives hands-on practice in big data and Artificial Intelligence.

Unit – I

Types of Digital Data: Classification of Digital Data – Structured data – Semi-Structured Data – Unstructured Data **– Introduction of Big Data –** Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – What is Big Data? – **Big Data Analytics:** Where do we Begin? – What is Big Data Analytics? – What Big Data Analytics Isn't? – Why this sudden Hype around Big data Analytics? – Classification of Analytics - Top challenges facing Big Data – Why is Big Data Analytics Important? – Data Science - Terminologies Used in Big Data Environment.

Unit – II

The Big Data Technology Landscape - NoSQL – Hadoop - .**Introduction to Hadoop :** Introduction to Hadoop – Why Hadoop? -Why not RDBMS? – RDBMS versus Hadoop – Distributed Computing Challenges - History of Hadoop - Hadoop Overview - Use case of Hadoop - Hadoop Distributors – HDFS – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN – Interacting with Hadoop Ecosystem.

Unit – III

Introduction to MongoDB : What is MongoDB? - Why MongoDB? – Terms Used in RDBMS and MongoDB –Data Types in MongoDB – **Introduction to Cassandra:** Apache Cassanda – An Introduction – Features of Cassandra – Collections – Alter Commands – Import and Export – Querying System Tables.

Unit – IV

Introduction to MAPREDUCE Programming: Introduction – Mapper – Reducer – Combiner – Partitioner - Searching – Sorting – Compressing – **Introduction to Hive:** What is Hive? – Hive Architecture – Hive Data Types – Hive File Format – Hive Query Language(HQL)

Unit – V

Introduction to Pig: What is Pig? - The Anatomy if Pig – Pig on Hadoop – Data Types in Pig – Running Pig – Execution Modes of Pig – HDFS Commands – Eval Functions – Complex Data Types **– Introduction to Machine Learning** – Introduction to Machine Learning - Machine Learning Algorithms.

Text Book:

Seema Acharya , Subhashini Chellappan, *Big Data and Analytics WILEY*, Reprint 2018.

Chapters:

Unit - I : 1.1 – 1.1.3, 2.1 - 2.5, 3.1 -3.5, 3.7, 3.10, 3.12

Unit - II : 4.1 – 4.2, 5.1, - 5.13.

Unit - III : 6.1 – 6.4, 7.1 – 7.2, 7.7, 7.10 - 7.12

Unit - IV : 8.1 – 8.8, 9.1 - 9.5

Unit - V : 10.1-10.3,10.7-10.10, 10.12 – 10.13, 12.1 – 12.2.

Reference Books:

1. Venkat Ankam, Big Data Analystics, Packt Publisher, 1st Edition, 2016.
2. David Loshin, Big Data Analytics, MK Publisher, 1st Edition,2013.
3. Jovan Pehcevski, Big Ata Anlytics- Methods and Applications, Arcler Education Incorporated, 1st Edition, 2018.
4. Mayank Bhushan ,Big Data and Hadoop: Learn by example 1st Edition, Kindle Edition.
5. Syed Muhammad Fahad Akhtar , Big Data Architect's Handbook: A guide to building proficiency in tools and systems used by leading big data experts Kindle Edition.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Digital Image Processing
Semester : V **Contact Hours : 5**
Sub Code : 18MCE5B **Credits : 5**

Objectives:

To study two-dimensional Signals and Systems. To understand image fundamentals and transforms necessary for image processing.

Unit-I:

Introduction: What Is Digital Image Processing? - The Origins of Digital Image Processing – Fundamental Steps in Digital Image Processing – Components of an Image Processing System. **Digital Image Fundamentals**: Image Sampling and Quantization – Some Basic Relationships between Pixels.

Unit –II:

Intensity Transformations and Spatial Filtering: Background – Histogram Processing – Smoothing Spatial Filters. **Filtering in the Frequency Domain:** Image Smoothing Using Frequency Domain Filters – Selective Filtering.

Unit-III:

Image Restoration and Reconstruction: A Model of the Image Degration/Restoration Process – Noise Models. **Color Image Processing:** Color Fundamentals – Color Models – Pseudocolor Image Processing – Basics of Full-Color Image Processing.

Unit-IV:

Wavelets and Multiresolution Processing: Multiresolution Expansions – Wavelet Transforms in One Dimension. **Image Compression:** Some Basic Compression

Methods: Huffman Coding – Golomb Coding – Arithmetic Coding – LZW Coding. **Image Segmentation: Thresholding:** Foundation – Basic Global Thresholding.

Unit-V:

Morphological Image Processing: Erosion and Dilation – Some Basic Morphological Algorithms: Boundary Extraction – Hole Filling – Extraction of Connected Components – Convex Hull – Thinning – Thickening. **Representation and Description:** Representation: Boundary (Border) Following – Chain Codes. Boundary Descriptors. **Object Recognition:** Patterns and Patterns Classes – Recognition based on Decision-Theoretic Methods: Matching – Optimum Statistical Classifiers. Structural Methods.

Text Book:

Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "*Digital Image Processing*", 3rd Edition Tata Mc Graw Hill Pvt. Ltd., 2016.

Chapters:

Unit-I : 1.1-1.2, 1.4 -1.5, 2.4-2.5

Unit-II : 3.1, 3.3, 3.5, 4.8, 4.10

Unit-III : 5.1-5.2, 6.1- 6.4,

Unit-IV : 7.2-7.3, 8.2, 8.2.1-8.2.4, 10.3, 10.3.1-10.3.2

Unit-V : 9.2, 9.5, 9.5.1-9.5.6, 11, 11.1.1 – 11.1.2, 11.2, 12.1, 12.2.1-12.2.2, 1 2.3

Reference Books:

1. Willliam K Pratt, "*Digital Image Processing*", John Willey, 2002.
2. S. Jayaraman, S. Esakkirajan And T. Veerakumar *Companion for Digital Image Processing, ,* Scilab Textbook, 2016 ,
3. Anil Jain K. "*Fundamentals of Digital Image Processing*", PHI Learning Pvt. Ltd., 2015.
4. Malay K. Pakhira, "Digital *Image Processing and Pattern Recognition*", 1st Edition, PHI Learning Pvt. Ltd., 2013.
5. Sonka-Hlavac-Boyle,*Image Processing,* 3rd edition, Analysis and Machine Vision 2014.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Internet Of Things
Semester : V **Contact Hours : 5**
Sub Code : 18MCE5C **Credits : 5**

Objectives:

To acquire knowledge about Internet of things, Domain Specific IoTs, IoT and M2M, IoT System Management, Platform design methodology, IoT Systems, IoT physical devices, Data Analytics for IoT.

Unit – I

Introduction to Internet of Things: Introduction – Physical Design of IoT-Logical Design of IoT-IoT Enabling Technologies- IOT Levels & Deployment Templates .D**omain Specific IoTs:** Introduction – Home Automation- Cities-Environment-

Unit –II

D**omain Specific IoTs:** Energy-Retail- Logistics-Agriculture-Industry- Healthy & Lifestyle. **IoT and M2M:** Introduction- M2M-Diference between IoT and M2M-SDN and NFV for IoT. **IoT System Management with NETCONF-YANG:**Need for IoT Systems management - Simple Network Management Protocol(SNMP)-Network Operator Requirements- NETCONF- YANG- IoT Systems Management with NETCONF-YANG

Unit –III:

IoT Platforms Design Methodology: Introduction – IoT Design Methodology- **IoT Systems – Logical Design using Python**: Introduction- Installing Python – Python Data Types & Dta Structures – Control Flow- Functions- Modules- Packages- File Handling – Date/ Time Operations- Classes- Python Packages of Interest for IoT

Unit- IV:

IoT Physical Devices & Endpoints: What is an IoT Device-Exemplary Device:Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi wtth Python – Other IoT Devices. **IoT Physical Servers & Cloud Offerings**: Introduction to Cloud Storage Models & Communication APIs- WAMP- AutoBahn for Iot . Xively Cloud for IoT- Python Web Application Framework – Django- Designing a RESTful Web API.

Unit – V:

Data Analytics for IoT: Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Oozie- Apache Spark- Apache Storm.

Text Book:

Arshdeep Bahga, Vijay Madisetti., Internet of Things , Universites Press India Private Ltd 1st Edition , 2015.

Chapters:

Unit - I :1.1 to 1.5 , 3, 2.1 to 2.4
Unit - II : 2.5 to 2.10, 3.1 to 3.4, 4.1 to 4.6
Unit - III : 5.1, 5.2, 6.1 to 6.11
Unit - IV : 7.1 to 7.7 8.1 to 8.5
Unit - V : 10.1 to 10.6

Reference Books:

1. Jamil Y. Khan and Mehmet R. Yuce, The *Internet of Things, Systems and Applications,* Jenny Stanford Publishing , 1st edition ,2019.
2. Pethuraj and Anupama C. Raman, *The Internet of Things,* CRC Press, An Auerbach Book,2017.
3. AdrianMcEwen & HakimCassimally, Designing The Internet of Things, Willey Publication, 1st Edition, 2014.
4. Pradeeka seneviratne, Hands – on Internet of Things with Blnk, Packt Publishing, 2018.
5. Sean Smith, The Internet of Risky Things: Trusting the Devoices and Surround us, O'Reilly Media, 1st Edition 2017.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Web Technology Lab
Semester : V **Contact Hours : 5**
Sub Code : 18MC51P **Credits: 3**

Program list:

1. Program to demonstrate the Frameset using HTML
2. Program to demonstrate the Frameset using HTML
3. Program for creating tables using HTML
4. Program for Creating Links using HTML
5. Program for Creating Forms using HTML.
6. Program for Filters and Transition in DHTML
7. Program for creating radio button using JavaScript
8. Program for Calculating the distance using JavaScript
9. Program for Login validation using JavaScript
10. program for Arithmetic operation using JavaScript.
11. Program to compute multiplication table using JSP
12. Program to pick up the data as the value of the search type request parameter using JSP.
13. Program to find lowercase to upper-case and vice-versa using JSP.
14. XML program to which will display the book information which includes the following details such as title of book, author name, ISBN number, Publisher, edition, price
15. Implement a 'Pizza order' application that allows WAP-equipped customer to submit orders for customized pizza via the web phones.

16. Program to create three-tier-application using JSP and Databases

    i) for conducting online examination

    ii) for displaying the students mark list

17. Program for form handling using servlets
18. Program using getRemoteuser() method through servlet.
19. JSP program to display a table with details of requests submitted by the staff member who invoked it. The table shoe for each request : request number, status, description and data submitted.
20. Build an application that combines

    i) Static form pages

    ii) A control servlet

    iii) A bean that loads its data from database tables and which provides access to its data through a function that returns an XML document.

    iv) A JSP that creates a response through the use of an XSL stylesheet that formats data from an XML document.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Data Mining & Data Warehousing Lab using Open Source Tools
Semester : V **Contact Hours : 5**
Sub Code : 18MC52P **Credits : 3**

Program List:

Using weka tool :

1. Demonstration of preprocessing on dataset student.arff

2. Demonstration of preprocessing on dataset labor.arff

3. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm

4. Demonstration of Association rule process on dataset test.arff using apriori algorithm

5. Demonstration of classification rule process on dataset student.arff using j48 algorithm

6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm

7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm

8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm

9. Demonstration of clustering rule process on dataset iris.arff using simple k-means

10. Demonstration of clustering rule process on dataset student.arff using simple kmeans

Using R tool :

11. Program to create data frames in R tools

12. Program for Subset & extend Lists in R Tools

13. Program to Plot Multiple Graphs in R- Tools

14. Program to implement Event Log Mining using R Tools

15. Program to Implement the Linear Regression.

16. Program to implement the Multiple Regression.

Using LaTeX tool :

17. Program to insert tables in LaTeX

18. Program to Implement Mathematical Formula in LaTeX

19. Program to LineBreak in Equation in LaTeX.

20. Progrm to Import the Picture in LaTeX.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Project Viva Voce
Semester : **VI**
Sub Code : 18MCPR6 **Credits : 12**

- Students are allowed to do their Project work under the guidance of the internal examiner.

- After one month duration during the first review students should present the overview of their project work , tentative title , overview of the project work and the determination of the modules.

- After two and half months duration in the second review student should show the development in their project work , tools and coding used.

- In the final evaluation students should appear for a oral presentation . They should present their project work in front of the internal and external Examiner. The Project report will be evaluated for 200 marks by the internal and external examiners with equal weightage.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Evaluation Pattern for M.C.A

Blue Print for Internal -PG

Internal : 25 Marks

Internals Question Pattern

I Internal Pattern: Marks : 30

Part - A (2 x 5 = 10) Duration :1 1/2hrs

(1 to 3) Answer any Two questions out of Three questions.

Part - B (2 x 10 =20)

(4 to 6) Answer any Two questions out of Three questions.

II & III Internal Pattern: Marks : 45

Duration :2 1/2hrs

Part - A (5 x 2 = 10)

(1 to 5) Answer all questions

Part - B (3 x 5 = 15) (Either or Type)

(6 to 8) Answer all the questions

Part - C (2 x 10 = 20)

(9 to 11) Anser any Two questions out of Three questions.

*** Internal Test Mark 120 will be converted to 15.**

Test Average	-	15
Assignment	-	05
Seminar	-	05
Total	-	25

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Blue Print for External - PG

Maximum Marks : 75
Duration : 3hrs

Part - A (5 x 2 = 10)

I. Answer all Questions

1 to 5 (One question from each unit)

Part - B (5 x 7 = 35)

II. Answer all Questions (Either or Type)

6 to 10 (One question from each unit)

Part - C (3 x 10 = 30)

III. Answer any three Questions out of Five Questions

11 to 15 (One question from each unit)

Project

Internal Project - 100

External Project

Report & Viva voce - 100

200