Ranchi Women's College, Ranchi

(An Autonomous Unit of Ranchi University from 2012)

COURSES OF STUDY

For

Master of Computer Application (Honours)

Choice Based Credit System

2021-2023

Under

Department of Computer Application
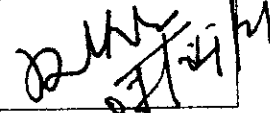
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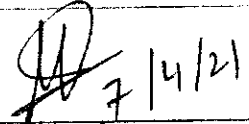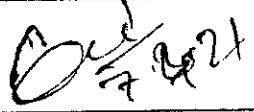
(Papers- CC:10 EC:4 Project:1)

Minutes of Meeting

A meeting of **Board of Studies** was held in the Department on 07-04-2021 at 03:00 pm onwards to review the syllabus of Master of Computer Application(MCA) Hons.
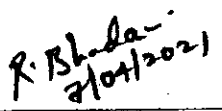
The members present were:-

University Nominee:-

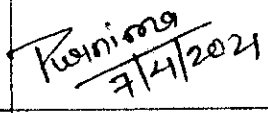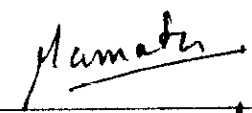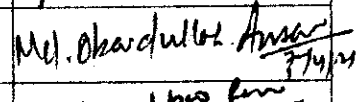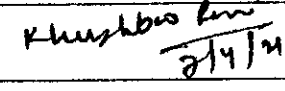| S. No.	Name	Designation	Signature
1.	Dr. Rajesh Kumar	Assistant Professor, University Department of Physics, DSPMU, Ranchi	
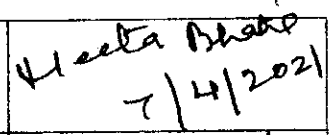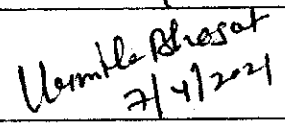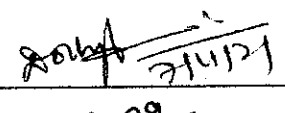
Subject Experts:-

2.	Dr. Madhumita Singh Niyogi	Associate Professor, Department of Computer Technology, XISS, Ranchi	
3.	Dr. Birendra Goswami	Assistant Professor , Dept. of Computer Science, ICFAI, Ranchi.	
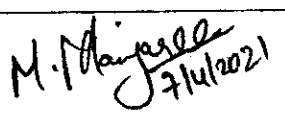
Coordinator:-

4.	Dr. Reena Bhadani (Computer Application)	Coordinator, Computer Application, Ranchi Women's College, Ranchi	

Faculties:-
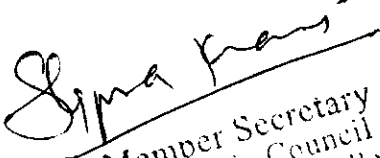
5.	Dr. Meeta Bhatia (Computer Application)	Lecturer, Dept. of Computer Application, Ranchi Women's College, Ranchi	
6.	Ms. Urmila Bhagat (Computer Application)	Lecturer, Dept. of Computer Application, Ranchi Women's College, Ranchi	
7.	Ms. Dolly Kumari (Information Technology)	Lecturer, Dept. of Information Technology, Ranchi Women's College, Ranchi	
8.	Ms. Purnima Kumari Srivastava (Information Technology)	Lecturer, Dept. of Information Technology, Ranchi Women's College, Ranchi	
9.	Ms. Mamata Pandey (Information Technology)	Lecturer, Dept. of Information Technology, Ranchi Women's College, Ranchi	
10.	Md. Obaidullah Ansari	Guest Faculty, Dept. Of MCA Ranchi Women's College, Ranchi	
11.	Ms. Khushboo Rani	Guest Faculty, Dept. Of MCA Ranchi Women's College, Ranchi	

Representative from Industry/Allied Field:-

12.	Ms. Meghna Manjaree	Associate Senior Software Engineer, Cerner Corporation, Bangalore	

Agenda: Discussion and approval of the syllabus based on CBCS Guidelines.

Resolution : CBCS Syllabus was approved with minor changes.

Member Secretary
Academic Council
Ranchi Women's College

CHAIRPERSON
ACADEMIC COUNCIL
RANCHI WOMEN'S COLLEGE

Department of Computer Application
SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
(Syllabus for 2 yr Degree Course: Master of Computer Application (MCA))

A meeting of board of Studies was held in the Department of Computer Application, Ranchi Women's College, Ranchi on 07-04-2021 at onwards to review the syllabus of Master ofComputer Application (MCA).

The details in the modification in the syllabus of Sem-I to Sem-IV are as follows:

Old(2019)	New (2020)	Remarks
3 years course	2 years course	3 years course of MCA is replaced with2 years course of MCA according to guidelines of UGC

Program Specific Outcomes

- Design and develop applications to analyze and solve all computer science related problems

- Analyze and review literatures to invoke the research skills to design, interpret and make inferences from the resulting data

- Communicate effectively and present technical information in oral and written reports

- Apply the knowledge of computer application to find solutions for real-life application

- Ability to analyze, design, develop and maintain the software application with latest technologies

- Utilize skills and knowledge for computing practice with commitment on social, ethical, cyber and legal values.

- Inculcate employability and entrepreneur skills among students who can develop customized solutions for small to large Enterprises.

Course Outcomes

Semester	Paper Code & Paper Name	Course Outcomes (After the completion of this course, students will be able to:)
Sem I	MCAFC – Computer Architecture and Networking	• Explain Digital Logic Circuits, Data Representation, Register and Processor level Design and Instruction Set architecture • Solve problems related to computer arithmetic and Determine which hardware blocks and control lines are used for specific instructions • Design a pipeline for consistent execution of instructions with minimum hazards • Explain memory organization, I/O organization and its impact on computer cost/performance. • Understand and be able to explain the principles of a layered protocol architecture; be able to identify and describe the system functions in the correct protocol layer and further describe how the layers interact. • Understand, explain and calculate digital transmission over different types of communication media.
	MCACC101 – Operating System	• Describe the main components of OS and their working • Explain the concepts of process and thread and their scheduling policies • Explain the various memory management techniques. • Compare the different techniques for managing memory, I/O, disk and files. • Explains the security and protection features of an Operating System. • Along with these knowledges, learn functionalities of Windows and Linux / Unix operating system.
	MCACC102 – Programming Concept with Java	• Learn the architecture of advanced swing components and design GUIs using them. • Learn to interface with external data sources with Java. • Leverage Java to create and deploy programs. • Use Java to design enterprise level Web sites. • Understand Java's component based programming model. • Learn Advance Java
	MCACC103 - Lab on JAVA and OS	• Explain basic concepts of object-oriented programming. • Use the characteristics of an object-oriented programming language in a program. • Use the basic object-oriented design principles in computer problem solving • Develop their own Applications /Projects using JAVA. • Learn use of different shell in Linux. • Use of Shell commands. • Shell programming.
Sem II	MCAEC201 – Analysis of Algorithm and Data Structure	• Identify the different notions of asymptotic complexity and determine the asymptotic complexity of algorithms including the solving of recurrence relations • Describe and use basic and advanced graph algorithms including DFS, BFS, and Bellman Ford • Analyse the difference between the dynamic programming concept and a greedy approach • Implement, analyze, and compare algorithms
	MCACC204 – Software Engineering	• Explain the software engineering principles and techniques • Apply Software Project Management Practices • Apply the knowledge gained for their project work as well as to develop software following software engineering standards • Analyze various methods of software testing strategies

		MCACC205 – Discrete Mathematics and Optimization Techniques	• Prepare the operational models for the real-world applications using Linear Programming • Apply the techniques to solve the Network Optimization models • Analyse the computational feasibility of the solutions using the Deterministic and Probabilistic Dynamic Programming
		MCACC206 – Lab on Data Structure through C/C++	• Design and analyze the time and space efficiency of various data structures • Analyze run-time execution of previous learned sorting methods, including selection, merge sort, heap sort and quick sort • Program for sorting, searching etc.
Sem III		MCAEC302 – i) DBMS ii) E-Commerce iii)Networking Security and Cryptography iv)PHP	• List the different issues involved in the design and implementation of a database system. • Use data manipulation language to query , update and manage a database. • To Understanding of the foundations and importance of E-commerce. • Describe Internet trading relationships including Business to Consumer, Business – to- Business, Intra-organizational • Understand, explain and solve mathematical problems for data-link and network protocols. • Describe the principles of access control to shared media and perform performance calculations. • Describe the various types of ciphers and hash functions. • Understand process of executing a PHP-based script on a webserver • Understand the syntax and use of PHP object-oriented classes. • Understand the PHP Get and Post methods working difference • Use PHP to access a MySQL database
		MCACC307 – Fundamentals of Management and ecommerce	• Apply business communication strategies and principles to prepare effectivecommunication for domestic and international business situations. • Participate in team activities that lead to the development of collaborativework skills. • Communicate via electronic mail, Internet, and other technologies anddeliver an effective oral business presentation. • To Understanding of the foundations and importance of E-commerce. • Describe Internet trading relationships including Business to Consumer, Business – to- Business, Intra-organizational
		MCACC308 – Data Science Using Python	• Read, Write and execute simple pythons programs • Decompose a Python program into functions, operators, looping etc. • simple python programming using Database • To understand visualizating data (Bar Chats, Line Charts)
		MCACC309 – Lab Based on Python and DBMS	• Explain the fundamental concepts, data definitions and query processing tasks in relational query languages. • Recognize database design theory, and evaluate functional dependencies and normal forms in databases. • Illustrate the essentials of the Python library, and learn how to learn about other part of the library when you need them • Demonstrate simple python programming using Database
SEM IV		MCACC410 – Computer Graphics	• Able to understand the concept of image formation as realized by human visual system. • Able to Illustrate the digitization process of images and related algorithms for drawing basic geometric figures in the 2D display devices. • Able to describe architecture of basic Input/ Output devices and their underlying working principles along with various primitives for drawing shapes. • Able to apply fundamental mathematics in producing spatial 3D-image of an object in an inherently 2D display device.
		MCAEC403 – i) IPR with Introduction to Modern Technologies	• Understand Intellectual Property assets. • Assist individuals and organizations in capacity building. • Distinguish information across organizations.

	ii) Numerical and Statistical Method iii) Management For IT Industries iv)Cloud Computing	• Work for development, promotion, protection, compliance, and enforcement of Intellectual Property and Patenting. • Solve algebraic, transcendental equation and linear system of equations using an appropriate numerical method arising in various engineering problems • Evaluate derivative at a value using an appropriate numerical method in various research problems, solve differential equation numerically • Identify security aspects of each cloud model • Implement a public cloud instance using a public cloud service provider
	MCAEC404 – i) Automata Theory ii) Enterprise Resource Planning iii) Mobile Computing with Android System iv) Internet of Things	• Relate formal languages and mathematical models of computation • Attain knowledge about different types of languages and the corresponding machines • Learn about the pushdown machine, Turing Machine and its role in compiler construction • To understand the Android Operating System • To develop applications using Google's Android open-source platform
	Project	• It makes the student confident in designing an Online Project • Students are trained to meet the requirements of the Industry.

COURSES OF STUDY FOR 2-YEAR (FOUR SEMESTER) M.C.A.

Table 3: Subject Combinations Allowed for M. C. A. Programme (80 Credits)

Core Course	Enhancement Course	Foundation Course	Project
CC	EC	FC	Project
10 Papers	4 Papers	1 Paper	1 Paper

Table 4: Semester wise Examination Structure for Mid Sem& End Sem Examinations:

Group Code	Paper Code	Papers	Credit	Mid Sem Theory (F.M.)	End Sem Theory (F.M.)	End Semester Practical / Viva Theory (F.M.)
SEMESTER I						
FC	MCAFC	Computer Architecture and Networking	5	30	70	
CC1	MCACC101	Operating System	5	30	70	
CC2	MCACC102	Programming Concept with Java	5	30	70	
CC3	MCACC103 (Pr.)	Lab on Java and OS	5	30		70
SEMESTER II						
EC1	MCAEC201	Analysis of Algorithm and Data Structure	5	30	70	
CC4	MCACC204	Software Engineering	5	30	70	
CC5	MCACC205	Discrete Mathematics and Optimization Techniques	5	30	70	
CC6	MCACC206 (Pr.)	Lab on Data Structure through C/C++	5	30		70
SEMESTER III						
EC2	MCAEC302	A. Database Management Systems B. E-Commerce C. Networking Security and Cryptography D. PHP	5	30	70	
CC7	MCACC307	Fundamentals of Management and ecommerce	5	30	70	
CC8	MCACC308	Data Science Using Python	5	30	70	
CC9	MCACC309	Lab Based On Python and DBMS	5	30		70

SEMESTER IV						
CC10	MCACC410	Computer Graphics	5	30	70	
EC3	MCAEC403	A. IPR with Introduction to Modern Technologies B. Numerical and Statistical Methods C. Management For IT Industries D. Cloud Computing	5	30	70	
EC4	MCAEC404	A. Automata Theory B. Enterprise Resource Planning C. Mobile Computing With Android System D. Internet of Things	5	30	70	
Project	Project	Final Project/Internship	5			100
			80	450	840	310

SEMESTER I
I. COMPULSORY FOUNDATION COURSE: FC(MCAFC)   (Credit : Theory– 05)
Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100Pass Marks
(SIA : 17 + ESE : 28) = 45

Instruction to Question Setter for Mid Semester Examination (MSE):

There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.
End Semester Examination (ESE):

There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.
Note: There may be subdivisions in each question asked in Theory Examinations .
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment
Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

COMPUTER ARCHITECTURE AND NETWORKING   Theory: 60 Lectures; Tutorial: 15 Hours

GROUP A COMPUTER ARCHITECTURE
Unit- I Parts Of A Computer: Processor (CPU), memory subsystem, peripheral subsystem. The memory interface: memory subsystem. Two main parts Of the processor apart from these interfaces: data path and control. Instruction Set Formats : Three — address and one address instructions general — purpose register architecture and accumulator architecture. Zero — address instructions and the stack architecture. Two — address instructions. Introductory Machine : Modern computer design, reduced instruction set computers (RISC), complex instruction set computers (CISC).

Unit – II Electronics fundamentals: Combinational functions and their implementation with gates and with ROM's, edge — triggered D-flip flops and sequential circuits. Implementation of data, path and control. Hierarchy Of Memory: Performance trade Offs : fast, small, expensive memories (static RAM); slower, larger, inexpensive memories (DRAM); redundant arrays of independent disks (RAID). Pipelining & Peripherals
Reference Books:
- Computer System and Architecture Morishmano
- Computer Fundamentals-Architecture and Organisation-B. Ram
- Modern Computer Architecture-Galgotia
- Computer Systems Organisation and Architecture-John D. Carpinelli. Pearson
- Computer System Architecture-P.VS. Rao, PHI
- Advanced Computer Architecture-A system design approach, Richard Y.Kain, Pearson

GROUP B DATA COMMUNICATION AND NETWORKING

Unit - I Data Communications and Networking Basics: Fundamental concept of Communications Model, Data Communications & Networking. Protocol Architecture: A Basic Protocol Architecture, OSI, The TCP/IP Protocol Architecture

Unit - II Transmission of Data: Concepts and Terminology, Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity. Guided and Wireless Transmission: Guided Transmission Media, Wireless Transmission, Wireless Propagation, Line-of-Sight Transmission.

Unit - III Signal Encoding Techniques: Digital Data Digital Signals, Digital Data Analog Signals, Analog Data Digital Signals, Analog Data Analog Signals. Types of Errors, Error Detection, Error Correction, Line Configurations, Interfacing.

Unit—IV Data Link Control: Flow Control, Error Control, High-Level Data Link Control (HDLC). Circuit Switching and Packet Switching: Switching Networks, Circuit-Switching Networks, Circuit-Switching Concepts, Control Signaling, Softswitch Architecture, Packet-Switching Principles, X.25, Frame Relay.

Routing in Switched Networks: Routing in Circuit-Switching Networks, Routing in Packet-Switching Networks, Least-Cost Algorithms

Text Book :

- W. Stallings - Data and Computer Communications, 7thEdn., Pearson Edn./ PHI, New Delhi, 2006
  Reference Books :
- B. A. Forouzan - Data Communications and Networking, 4thEdn. TMH, New Delhi 2006
- P.C. Gupta — Data Communications and Computer Networks, PHI, New Delhi 2006.

SEMESTER I

I. CORE COURSE : CC1 (MCACC101)   **(Credit : Theory– 05)**
Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)
Pass Marks (SIA : 17 + ESE : 28) = 45

Instruction to Question Setter for
Mid Semester Examination (MSE):
There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.

End Semester Examination (ESE):
There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.

Note:There may be subdivisions in each question asked in Theory Examinations. The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

OPERATING SYSTEM   Theory: 60 Lectures; Tutorial: 15 Hours

Unit – I **Operating Systems Introduction:** OS and the Computer System, Efficiency, System Performance and User Convenience, Classes of Operating Systems, Batch Processing Systems, Multiprogramming Systems, Time Sharing Systems, Real Time Operating Systems, Distributed Operating Systems, Modern Operating Systems.

Unit - II **Processes and Threads:** Processes and Programs, Programmer view of Processes, OS view of Processes, Threads, Case studies of Processes and Threads.

Unit - III **Scheduling Concepts:** Preliminaries, Non-preemptive Scheduling Policies, Preemptive Scheduling Policies, Scheduling in Practice, Real Time Scheduling, Scheduling in Unix, Scheduling in Linux, Scheduling in Windows, Performance Analysis of Scheduling Policies.

Unit – IV **Memory Management:** Managing the Memory Hierarchy, Static and Dynamic Memory Allocation, Memory Allocation to a Process, Reuse of Memory, Contiguous Memory Allocation, Non-contiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging, Kernel Memory Allocation, A Review of Relocation, Linking and Program Forms.

Unit V – Virtual Memory: Virtual Memory Basics, Demand Paging, Page ReplacementPolicies, Memory Allocation to a Process, Shared Pages, Memory Mapped Files, Linux Virtual Memory, Virtual Memory using Segmentation.

Unit VI - File Systems: File System and IOCS, Files and File Operations, Fundamental File Organizations, Directory Structures, File Protection, Interface between File System and IOCS, Allocation of Disk Space, Implementing File Access, File Sharing Semantics, File System Reliability, Virtual File System, Linux File System, Windows File System, Performance of File Systems.

Unit -VII **Security and Protection:** Overview of Security and Protection, Goals of Security and Protection, Security Attacks, Formal and Practical aspects of Security, Encryption, Authentication and Password Security, Access Descriptors and the Access Control Matrix, Protection Structures, Capabilities, Linux Security, Windows Security.

Reference Books:
⌐ D.M. Dhamdhere- Operating Systems: A Concept-Based Approach, TMH,
| A. Silberschatz et.al-Operating System Concepts, 6thEdn, John Wiley, Indian   Reprint, 2003.
⌐ C.Cronsley-Operating Systems: A Design-Oriented Approach, TMH, New Delhi,   2002.
   H.M.Deitel-Operating Systems, 2ndEdn, Pearson Education, 2003.
   A.S.Tanenbaum-Operating System: Design and Implementation, PHI, New Delhi,

<u>**SEMESTER I**</u>

I. CORE COURSE: CC2 (MCACC102)   **Credit : Theory–5**
Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)
Pass Marks (SIA : 17 + ESE : 28) = 45

<u>Instruction to Question Setter for</u>
<u>Mid Semester Examination (MSE):</u>
There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.
<u>End Semester Examination (ESE):</u>
There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.
Note: There may be subdivisions in each question asked in Theory Examinations
           The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

PROGRAMMING CONCEPTS WITH JAVA   Theory: 60 Lectures; Tutorial: 15 Hours

Unit I- Fundamentals of Java programming: Introduction to Object Oriented Programming Language, Difference with C and C++. Introduction to Java, Basic features of Java, Java Architecture, JDK Tools, Java standard Library (JSL), Keywords, Identifiers Data
Types, Operators, Precedence Summary, Punctuation Symbols Unicode Characters.
Condition and looping control statements for, for each, break continue

Unit II- Class and Object: Declaring a Class, Creating an Object, Methods, Exploring New Operator, constructor its types, Finalizes, this Keyword, Access Specifies, Recursion, Inheritance, Polymorphism, Overriding Methods, Runtime Polymorphism, Implementing Abstract classes, packages and interfaces.

Unit III- String: Concatenation and Changing Case, Sub strings Data Conversion String Buffer, Types of Array, Array of Objects, Wrapper Class, Vector Class, Exception Handling and Threads: Syntax for Exception Handling Mechanism, User Defined Introduction to Threads, Multi - tasking and Multi – threading, Exception handling.

Unit IV- File input and Output: File Class, Byte Stream Classes Reading from and Writing to a File, Character Stream Classes, Random Access File, Sequence Input Stream, Binary files. Data Base Connectivity: ODBC API, JDBC Application Architecture, Java. SQL, Obtaining a connection, step connecting Object, Working with Result, statement, Set Meta Data Interface.

Unit V – Advance JAVA : Introduction of web application and execution method, Introduction to Servlet JSP, MVC architechture, Designing a View Component, Designing a Model Component, Designing a Controller Component, Web container behavior, Dispatch from a controller servlet to a view servlet, Deploy a web application, Describe the purpose of Session management, Cookies implementation of session management, URL-rewriting, Filter API, Filter class, Configure a filter in deployment descripter file.

Unit VI – Java Data Base Connectivity: Design a web application to integrate with a DBMS, Configure a DataSource and JNDI API, JSP technology, Scripting elements, Page directive, Standard tags, Describe and implement expression language (EL)

Unit VII – Introduction to EJB: The Features of Enterprise Javabeans ,Various
Components of EJB Architecture, Roles and Responsibilities Provided by EJB Specification, Different Types of Enterprise Javabeans, Components of Enterprise Javabeans, Create and Deploy Stateless Session Beans, Create Applications Using Stateless Session Beans.

Reference Books:

- Richard A. Jhonson, "An Introduction to Java Programming and Object Oriented Application Development" . Detail-Java How to Program, Pearson Education, New Delhi.
- Balagurusamy, Java Programming, TMH, New Delhi, 2005.
- James M. Sleek, Programming and Problem Solving with Java, Thomson Learning, Indian Edition,
- P.V.S. Rao, Computer system architecture, PHI
- Herbert Schildt, The Complete Reference, TMH

SEMESTER - I

I. CORE COURSE: CC3 (MCACC103)   **Credit : Practical–5**
Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)
Pass Marks (SIA : 17 + ESE : 28) = 45

<u>Instruction to Question Setter</u> Mid Semester
<u>Examination (MSE):</u>
There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.
<u>End Semester Examination (ESE):</u>
There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.
Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

Group A
Lab on JAVA programming
Write a program in Java for following:

1. To illustrate Arithmetic, Relational, Boolean, Bitwise, Shift Operators.
2. To illustrate Precedence Rule.
3. To use "If-else" & "Switch Cases"
4. To use "For Loop" , "While Loop" & "Do- While loop".
5. To use "Break" & "Labeled Break" .
6. For class declaration & object initialization.
7. For calculating "simple interest" using class, object & methods.
8. For method overloading.
9. For finding volume of cuboid by using Constructor & Parameterized Constructors.
10. For Static initialization block, Instance initialization block & Constructor.
11. For creation, initialization, setting values and then sorting in 1 dimension array
12. For matrix multiplication.
13. For Nested classes.
14. For method of overriding.
15. For Inheritance.
16. For Encapsulation.
17. For Abstract Class & Abstract Methods.
18. For class implementing interface.
19. For using inbuilt packages. E.g. Fact, Static, Import etc.
20. For Wrapper classes.
21. For Declaration, Creation, Finding Length, Comparison, Region Matching, Index of Character, occurrence of particular string, character at particular position, Test for Equality related to string.

22. For Try-Catch, Multiple Catch, Throw &Rethrow Exception, Finally, User Defined Exception, Exception Encapsulation.
23. For creating Thread.
24. File Handling
25. Database Connectivity
26. Programming with the Java Tools: Javaap, Jcmd, Jhat, Jdb, Jar
27. Java API Components AWT to create Components, Containers- window, frame, dialog, panel.
28. Swing J components Class, Dialog boxes, Panels, Labels, Checkboxes, Menus, Toolbars and Actions, Sliders, Spinners, Progress bars, Scrollbars, List and Combo boxes, Text-
entry Components, Colour and File Choosers, Tables and Trees, Printing with 2D API, Java Print Service API.
29. JDBC Drivers for RDBMS, SQL to Java type Mapping, Use of **java.sql**
30. XML structure, XML example document, Node interface, Document Node Methods, Element Node properties, Text Nodes. Parsing an XML Document with DOM tree, Generating an XML document with DOM, Validating XML Documents using DTD and XML schema, Transforming XML using XSLT.
31. Introduction, Working with URL connections, URL encoders and decoders.
32. Application Packaging, Servlets, The Servlet API, The User Experience, Building a Web App with Continuity, Framework for Building Web Applications, Building Robust Web Apps.
33. Developing a simple Bean, create a source file for the new Bean, Create an instance of the colour Bean, Bean interfaces, Message Driven Beans, EJB-Based Application.

Reference Books:
- David karlins, Dreamweaver CSS.5 Mobile and Web Development with HTML5, CSS3, and JQuery, SPD
- Richard C.LEE, William M. tepfenhart, UML and C++, PHI 3.E. Balagurusamy, Java Programming, TMH, New Delhi, 2005.
  - James M. Sleek, Programming and Problem Solving with Java, Thomson Learning, Indian Edition

Group B
Lab on Operating System

Unit – I UNIX Architecture and Command Usage : UNIX Architecture, Features, POSIX and single UNIX Specification, Locating Commands, Internal and External Commands, Command Structure, Flexibility of Command Usage, Man browsing and Documentation, **man-k, apropos, whatis.**

Unit - II General Purpose Utilities : cal, date, echo, printf, bc, script, Email Basics, **mailx, passwd, who, uname, tty, sty.**

Unit - III The File System : The File, The Parent-child Relationship, The HOME Variable, **pwd, cd, mkdir, rmdir,** Absolute and Relative Pathname, **ls,** The UNIX File System.

Unit - IV Handling Ordinary Files : Cat, cp, rm, mv, more, The Ip Subsystem, **file, wc, od, cmp, comm, diff, dos2unix, unix2dos,** Compressing and Archiving Files, **gzip, gunzip, tar, zip, unzip.**

Unit - V   Basic Files Attributes : ls –l, ls –d, File Ownership and Permissions, **chmod,** Directory Permissions, Changing File Ownership.

Unit - VI   The vi Editor : viBasics, Input Mode, Saving Text and Quitting, Navigation, Editing

Text, Undoing Last Editing Instruction (U and U), Repeating Last Command(.), Searching for Pattern(/ and ?), Substitution- Search and Replace(:s).

Unit - VII   The Shell: Shell's Interpretive Cycle, Shell Offerings, Pattern Matching, Escaping and Quoting, Redirection- The 3 standard files, **/dev/null** and **/dev/tty,** Pipes, **tee,** Command Substitution, Shell Variables.

Unit - VIII   The Process: Process Basics, **ps,** System processes(-e or –a), Mechanism of Process Creation, Internal and External Commands, Process States and Zombies, Running Jobs in Backgrounds, **nice,** Killing Processes with Signals, Job Controls, **cut, paste, sort, uniq, tr.**

Unit - IX   Essential Shell Programming : Shell Scripts, **read,** Command Line Arguments, **exit** and Exit Status of Commands, Logical Operation **&&**and **||,** The **if** Conditional, Using **test** and [ ] to evaluate Expressions, The **case** conditional, **expr, $0, while, for, set** and **shift,** The Here Document, **trap,** Debugging Shell Script with **set –x,** Sample Validation and Data Entry Scripts.

Reference Books:

Sumitabha das- Unix Concepts & Applications, Tata McGraw Hills.
Lowell Jay Arthur & Ted Burns-Unix Shell Programming, Galgotia Publication

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SEMESTER II

II. ENHANCEMENT COURSE: EC - 1(MCAEC201)   (Credit : Theory– 05)
Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100Pass
Marks (SIA : 17 + ESE : 28) = 45

Instruction to Question Setter
Mid Semester Examination (MSE):

There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.

End Semester Examination (ESE):

There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations .

The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

ANALYSIS OF ALGORITHM AND DATA STRUCTURE
Theory: 60 Lectures; Tutorial: 15 Hours

GROUP A ANALYSIS OF ALGORITHM

Unit I - ElementaryAlgorithmic & Asymptotic Notation: The Efficiency of Algorithms, Average and Worst-Case Analyses, Amortized Analysis, A Notation For "The Order Of", Asymptotic Notations: Conditional, With Parameters, Operations: Asymptotic Notation.

Unit II -Algorithms: Greedy Algorithm's: Characteristics, Graphs: Minimum Spanning Trees, Shortest Paths, The Knapsack Problem, Scheduling Concepts. Divide-And-Conquer: Multiplying Large Integers, Binary Search, Sorting, Finding the Median, Matrix Multiplication, Exponentiation.

Unit III - Dynamic Programming: Calculation of Binomial Coefficient, The World Series, Making Change, The Principle of Optimality, The Knapsack Problem, Shortest Paths, Chained Matrix Multiplication.

GROUP B: DATA STRUCTURE

Unit I - Array and Linked Applications: Array and Linked list and the applications. Stack Array Implementation and Linked List Implementation, Applications of Stack, Stack ADT, Queue: Array Implementation and Linked Implementation, Applications of queue, Queue ADT.Recursion: Factorial numbers, Fibonacci numbers, Towers of Hanoi.

Unit II- TreesConcepts: Basic Tree Concepts, Binary Trees, Operations of Binary Tree. Binary Search Trees, AVL Trees, AVL Tree Implementation, AVL Abstract Data Type.

Heap Definition, Heap Structure, Basic Heap Algorithms, Heap Data Structure, HeapAlgorithms, Heap Applications. M-Way Search Trees, B-Trees, Simplified B-Trees.

Unit III - Searching & Sorting Concepts: List Searches, Hashed List Searches. Collision Resolution. General Sort Concepts, Insertion Sorts, Selection Sorts, Exchange Sorts, External Sorts.

Reference Books:

- E. Horowitz. et.al., Fundamentals of Computer Algorithms, Galgotia Publication Pvt.
- Ltd., New Delhi.
- S. Sahani et.al – Data Structures, Algorithms and Applications in C++ ,Universities Press.
- J. Kleinberg & E. Tardos, Algorithm Design, Pearson Education, New Delhi.
- T.H. Cormen et.al., Introduction to Algorithms – PHI, New Delhi.
- G Brassard & P Bratley - Fundamentals of Algorithmics PHI, New Delhi.
- S. Dasgupta et.al., Algorithm, TMH, New Delhi
- R.F.Gilberg& B.A. Forouzan, Data Structures: A Pseudocode Approach with C++, 2nd Edn, Brooks/Cole-Thomson Learning, Indian Reprint.
- E.Horowitz, Fundamentals of Data Structures in C++, Galgotia Publication, New Delhi
- M.T.Goodrich, Data Structures and Algorithms in C++, John Wiley, Inc. Indian

SEMESTER - II

II. CORE COURSE: CC4 (MCACC204)   (Credit : Theory– 05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100
Pass Marks (SIA : 17 + ESE : 28) = 45

Instruction to Question Setter
Mid Semester Examination (MSE):
There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.
End Semester Examination (ESE):
There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.
Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

SOFTWARE ENGINEERING   Theory: 60 Lectures; Tutorial: 15 Hours
Unit I - Basics: Evolving Role of Software, Changing Nature of Software, Legacy Software, Software Engineering – A layered Technology.

Unit II – Process Model: Process Frame work, Process Patterns, Process Models, Waterfall Model, IncrementalProcess Models, Evolutionary Process Models, Specialized Process Models, Unified Process Model, Agile Process Model.

Unit III- Requirement Engineering: An approach to design and construction, Requirementspecification, Initiating the Requirement Engineering Process, Functional and Non Functional Requirements, Developing Use case, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

Unit IV- Design Engineering: Design Process Approaches, Design Concepts, Quality, DesignModels, Pattern Based Software Design. Cohesion and Coupling, Software Design Object oriented vs Function Oriented designs. User Interface Design –Input and Output Interfaces, Component –Based GUI Development, a User Interface design Methodology

Unit V: Testing Strategies and Testing Tactics: Strategic Approach to software Testing, TestStrategies for conventional and Object Oriented Software, Validation Testing System Testing, White Box Testing, Basis Path Testing Control Structure Testing, Black Box Testing, Object Oriented Testing Methods. Test coverages, Test plan

Unit VI- Metric for process and Estimation Techniques: Process metrics, Software Measurement, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for Object Oriented Projects Specialized Estimation Techniques, COCOMO models.

Unit VII- Software Quality and Configuration Management: Quality Concepts, Software Quality Assurance, Software Reliability, Software Configuration Management, SCM Repository, SCM Process. Computer Aided Software Engineering (CASE) Tools, Types of CASE tools. Current trends in Software Engineering – Software engineering for projects and products. Introduction to web engineering and Agile process.

Reference Books:

- Roger S. Pressiman, Software Engineering – A Practitioner's Approach, TMH, 7th Ed.
- R. Fairley, Software Engineering – Concepts , TMH, 2nd Ed.

- Rajib Mall, Software Engineering, PHI.
- P. Jalote, An Integrated Approach to Software Engineering, Narosa.
- R.Khurana, Software Engineering, Vikas Publishing House
- Ian Sommerville, Software Engineering, 7thEdn., Pearson Education.

SEMESTER II

II. CORE COURSE: 5 (MCACC205)   **(Credit : Theory– 05)**

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100Pass

Marks (SIA : 17 + ESE : 28) = 45

Instruction to Question Setter

Mid Semester Examination (MSE):

There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.

End Semester Examination (ESE):

There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations

                 The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

DISCRETE MATHEMATICS AND OPTIMIZATION TECHNIQUES

Theory: 60 Lectures; Tutorial: 15 Hours

GROUP A DISCRETE MATHEMATICS

Unit I - Mathematical Logic: Propositions, Connectives, Equivalence of Formula, Well FormedFormula, Tautulogies, Principle Of Duality, Logic Gates & Units, Normal Form, Rule Of Inference, The Predicate Calculus.

Unit II - Relation & Function: Product Sets, Partition, Binary Relation in a Set, Domain & Range,The Matrix of Relation & Digraph, Path in Relation & Digraph, Boolean Matrices, Adjacency Matrix of a Relation, Properties of Relation, Equivalence

Relation, Warshall's Algorithm. Sum & Product of Function, Types of Functions, Compositions of Function, Inverse of Functions, Hashing Function, Characteristic Function of a Set, Permutation Function.

Unit III - Lattice Theory: Partial Order Set- Hasse Diagram, Isomorphism, Duality, Product Of TwoSets, Lattice As Poset- Lattices As Algebraic System, Complete Lattice, Bounded Lattice, Sub Lattice.

GROUP B OPTIMIZATION TECHNIQUES

Unit I- Introduction: Meaning &Definition of OR, Decision Making, Scope and Applications, Formulation of Linear Programming Problem,

Methods of L.P.P. : The Graphical Method : Definition, Graph of Linear Inequality, Graphical Method of Solution ofLinear Programming Problems

The Simplex Method : Definition, Fundamental Theorem, General Formulation, Matrix Form,Standard Form, Maximisation, Minimization & Mixed Constraint Problems, Special Cases in Simplex Method.

Unit II: Transportation & Assignment Problems: Definition,   Transportation Algorithm, Methods for Finding Initial Solution, Test for Optimality, Trans-shipment Problem. Introduction to Assignment Problem,

Mathematical Model, Solution Methods of Assignment Problems, Cases in Assignment Problems, Travelling Salesman Problem.

Unit III Decision Theory: Introduction, Structure of Decision Making Problem, Optimism Criterian (Maximax/Minimin Criterion), Pessimism Criterion or Wald Criterion, Minimax Regret Criterion, Laplace Criterion, Hurwicz Criterion, Expected Monetary Value, Expected Opportunity Loss, Expected Value of Perfect Information, Decision Trees.

Game Theory : Game Theory Concept, Pure Strategy Games(With Saddle Point), Mixed Strategy Games(without Saddle Point)

Unit IV- Project Management: Network Analysis Concept, Critical Path Analysis, Program Evaluation and Review Technique (PERT), Network Crashing (Time-Cost Trade-off), Updating Network.

Unit V- Computational Aspects of Optimization Techniques: Implementation of Optimization Techniques through Computer Programming, Solution of Optimization Technique through Existing Software.

Reference Books:

1. Discrete Mathematics With Graph Theory, S.K. Yadav, Ane's Books Pvt. Ltd.
2. Kolman, Busby, Ross, Rehmann: Discrete Mathematical Structures, 5/E, Pearson Education, 2006.
3. Discrete Mathematics, Swapan Kumar Chakraborty, BikashKantisarkar, Oxford University Press
4. R.K. Gupta, Operations Research, Krishna's Educational Publication
5. J.P. Singh, N.P. Singh- Operations Research, Ane's Books Pvt. Ltd.
6. KantiSwarup, P.K. Gupta, Man Mohan, Operation Research, Sultan Chand & Sons, New Delhi
7. Ronald L. Rardin, Optimization in Operations Research, pearson Education, New Delhi.
8. Rao, Optimization Theory & Application, Wiley Eastern Ltd.

SEMESTER II

II. CORE COURSE: CC6 (MCACC206)   **(Credit : Practical– 05)**

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100Pass

Marks (SIA : 17 + ESE : 28) = 45

Instruction to Question Setter for

Semester Internal Assessment (SIA):

There will be **two** questions in Practical Examination of 3Hrs.out of which **any one** is to be answered. The questions in practical examination will be of equal to 20 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce.

End Semester Practical Examination (ESE Pr):

Lab: There will be **four** questions in Practical Examination of 3Hrs.out of which **any two** are to be answered. Student haveto Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

The questions in practical examination will be of equal to 50 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page+ acknowledgment + index) & Bibliography may be printout. No Xerox copy is allowed.

LAB BASED ON Algorithms and Data Structure   Practical: 60 Lectures; Tutorial: 15 Hours

Programs for
1. Arrays
2. Linked lists
3. Application of linked lists
4. Stack with array and linked list
5. Application of stack
6. Queue with arrays
7. Binary search tree
8. AVL tree
9. Graphs
10. Transitive closure
11. BFS, DFS
12. Spanning tree
13. M-way trees
14. B-trees
15. Dijkastra's Algorithm
16. Knap-sack problem etc.

SEMESTER III

III. ELECTIVE COURSE: EC - 2(MCAEC302)   (Credit : Theory– 05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100Pass

Marks (SIA : 17 + ESE : 28) = 45

<u>Instruction to Question Setter</u>

<u>Mid Semester Examination (MSE):</u>

There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.

<u>End Semester Examination (ESE):</u>

There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.

Note:There may be subdivisions in each question asked in Theory Examinations .The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment

Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

A. DATABASE MANAGEMENT SYSTEM (Theory:60 Lectures Tutorial: 15 Hours)

Unit-I   **Data models:** Conceptual model, ER model, object oriented model, UML logical data model, relational, object oriented. **Physical data models:** Clustered, un clustered files, dices(spares and denser) , B+ tree, join indices, hash and inverted files, grid files, bulk loading, external sort, time complexities and file selection crieteria .

Unit-II Relational database design: Schema design, normalization theory, functional dependencies, higher normal forms, integrity rules, relational operators

Unit-III Object   **oriented database design**:   Objects, methods, query languages, implementations, comparisons with relational systems, object orientation in relational Database systems, object support in current relational database systems, complex object model, implementation techniques. Mapping mechanism: Conceptual to logical schema, key issues related to for physical schema mapping.

Unit –IV   **DBMS concepts**: Acid property, concurrency control, recovery mechanisms, case study integrity, views & security, integrity constraints, views management, data security.

Unit –V   **Query processing**   : query Optimization-Heuristic and rule based optimizers, cost estimates, transaction management.

Unit –VI   **Case study**: Oracle/ posters DBMS packages : understanding the transaction processing concurrency and recovery protocols, query processing and optimization mechanisms through appropriate queries in SQL and PLSQL.

Unit –VII Advanced topics: Other databases systems, distributed, parallel and memory resident, temporal and spatial databases, introduction to data warehousing, on-line analytical processing, data mining, bench marking related to DBMS packages, database administration.

Unit VIII: Data Warehousing and Mining: classification, association rule and clustering

Unit IX - Big Data Analytic: introduction, cloud and big data, Hadoop, RDBMS and big data, big data analysis and data warehouse

Reference Books:

- Database system concept, Silberschtz, korth and sudershan.
- A introduction to database system, C.J.Date, A.kannan, S.Swamynathan, pearson
- Database modelling and design, Tobyteorey, Samlightstone, Tomnodeau, Elsevier
- Fundamental of database system fourth edition, pearson, Elmasri&Navathe

- Principal of database management, PHI, James Martin
- Database management system, Mc Grawhill, Ramkrishnan, gohrke
- An introduction to database system-Desai, Galgotia

B. E-COMMERCE   (Theory: 60 Lectures; Tutorial: 15 Hours)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =
100Pass Marks (SIA : 17 + ESE : 28) = 45
__Instruction to Question Setter__
__Mid Semester Examination (MSE):__
There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.
__End Semester Examination (ESE):__
There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.
Note:There may be subdivisions in each question asked in Theory Examinations
                    C.   The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

Unit I- Introduction: Electronic Commerce, Scope of Electronic Commerce, Key Factors of E-Commerce, Benefits and Limitations of E-Commerce, E-Business, Difference Between E-Commerce and E-Business.

Unit II- Business Strategy In An Electronic Age: Value Chain, Supply Chain, Porter's Value Chain Model, Inter Organizational Value Chains, Competitive Advantage, Competitive Strategy. Porte's Model, First Mover Advantage, Competitive Advantage Using E-Commerce.

Unit III - Applications: Direct Marketing And Selling, Value Chain Integration, Supply Chain Integration, Corporate Purchasing, Home Shopping, Recruitment, Travel, On-Line Payment, Impact of E-Commerce, Security Issues in E-Commerce and Payment Settlement System.

Unit VI- Classification: Framework for E-Commerce, Classifications, Barriers to E-Commerce

Unit V- Electronic Market: Markets, Electronic Markets, Usage of Electronic Markets, Advantages and Disadvantages of Electronic Market.

Unit VI- Electronic Data Interchange (EDI): Definition, Benefits, EDI Technology, EDI Communications, EDI Implementations, EDI Security, Internet: Internet, TCP/IP Internet Components.

Reference Books:
1. David Whitley, E-Commerce: Strategy, Technologies and Applications, TMH
2. Ravi Kalakota & Andre Whinston, Electronic Commerce: A Manager's Guide, Pearson Education
3. P.T. Joseph, E-Commerce: A Managerial Perspective, PHI

C. NETWORK SECURITY AND CRYPTOGRAPHY
Theory: 60 Lectures; Tutorial: 15 Hours

GROUP :A- BASICS OF NETWORKING

Unit I - Fundamental concept of Communications Model, Protocol and Architecture: A Basic Protocol Architecture, OSI, The TCP/IP Protocol Architecture, Types of Networks.
Unit II - Communication Techniques: Transmission of Data: Analog and Digital Data, Guided and Wireless Transmission, Asynchronous and Synchronous Transmission.
Unit III - Multiplexing: Frequency Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing. Switching Networks, Circuit-Switching Networks, Circuit-Switching Concepts, Packet-Switching Principles, X.25, Frame Relay.

GROUP :B- SECURITY AND CRYPTOGRAPHY

Unit IV - Attacks on Computers and Computer Security: Introduction, The Need for Security, Security Approaches, Principles of Security, Types of Attacks.

Unit V - Cryptography- Concepts and Techniques: Introduction, Plain Text and Cipher Text, Symmetric and Asymmetric Key Cryptography, Steganography. Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA), Advanced Encryption Standard (AES). Asymmetric Key Algorithms: Digital Signatures and RSA algorithm.

Unit VI - Internet Security Protocols: Introduction, Basic Concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP) , Time Stamping Protocol (TSP) , Secure Electronic Transaction (SET), SSL versus SET, 3-D Secure Protocol, Electronic Money, Email Security, Wireless Application Protocol (WAP) Security, Security in GSM, Security in 3G.

Unit VII - User Authentication and Kerberos: Introduction, Authentication Basics, Passwords, Authentication Tokens, Certificate-based Authentication, Kerberos, Key Distribution Center (KDC), Digital Certificates, Private Key Management, Public Key Cryptography Standards (PKCS),

Unit VIII - Network Security, Firewalls and Virtual Private Networks (VPN): Introduction, Brief Introduction to TCP/IP, Firewalls, IP Security, Virtual Private Networks (VPN), Intrusion.

Reference Books:
1. W. Stallings - Data and Computer Communications, Pearson Edu. PHI.
2. B. A. Frouzan - Data Communications and Networking, TMH.
3. A.S. Tanenbaum, Computer Networks, PHI
4. B.A. Frouzan – Cryptography & Network Security, TMH, New Delhi.
5. S. Stalling – Cryptography and Network Security Pearson Edu., New Delhi.
6. A. Kahate- Cryptography and Network Security, TMH, New Delhi.
7. Pfleeger, C.P., Security in Computing, 5e, Prentice Hall
8. Schneier Bruce, Applied Cryptography, 2e, John Wiley & Sons
9. Christofpaar, Jan Pelzel, Understanding Cryptography: A Textbook for Students and Practioners, 2e, Springer
10. Jahangiri A, Live Hacking: The Ultimate Guide to Hacking Techniques & Counter Measures for Ethical Hackers & IT Security Experts

D. PHP (Theory: 60 Lectures; Tutorial: 15 Hours)

Unit I- Introduction: Comments, Syntax, Variables, Constants, Commands, Scope Of Variable. Expressions, Operators, Conditional Statement, Looping Constructs, Casting, Dynamic Linking. PHP Functions, Including And Requiring Files, PHP Version Compatibility, PHP Objects. Numerically Indexed And Associative Arrays, Foreach Loop, Array Functions. Using Print –Precision Setting, String Padding, Using Sprint;, Date And Time Functions, File Handling.

Unit II- Introduction To MySQL: MySQL Basics, Database Design and Terms, Data Types, Functions, Accessing MySQL via Command Line, Indexes, Accessing MySQL via PHP My Admin, Normalization, Relationship, Transactions, Backing Up and Restoring.

Unit III- Accessing MySQL Using PHP: Process, Connecting to MySQL Database, Deleting a Record, Displaying Form, Querying Database, Running Program, Table Operation-Creation, Description, Drop; Operations On Data- Addition, Retrieving, Updating, Deletion; Preventing Hacking Attempts, Using MySQL Procedurally.

SEMESTER III

III. CORE COURSE : CC 7 (MCACC307)   (Credit : Theory– 05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100Pass
Marks (SIA : 17 + ESE : 28) = 45

<u>Instruction to Question Setter for</u>
Mid Semester Examination (MSE):
There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.
End Semester Examination (ESE):
There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.
Note: There may be subdivisions in each question asked in Theory Examinations .
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5)

Fundamentals of Management and ecommerce

GROUP :A- Fundamentals of Management and organizational behavior
Unit I: Introduction To Management & Organisational Behaviour
Management: Nature & Concept of Management; Evolution of Management Thought; Functions of Management, Organisational Behaviour: Nature and Concept, Personality, Motivation, Leadership, Group Dynamics, Conflict Management, Stress Management.
Management Information System :
Definition of a system, types of a system, Information, characteristics of information, Need of an efficient Information system, Basic concept of MIS: features of MIS, Concepts of MIS, Pre Requisites of effective MIS, limitations of MIS, Establishing the information needs in management process, Organization structure and Information Need. Introduction to DSS, KBS,
Unit II: Effective Communication Skills :
Basics of Communication: Meaning and Definition, Objectives, Principles of Effective Communication, Flow of Communication, Types of Communication, Barriers to Communication. Channels of Communication: Verbal and Non-verbal Communication, Communication Network, Official Correspondence, Resume Preparation, Interview, Soft Skills: Extempore, Group Discussion and Presentation.

GROUP B E-COMMERCE   (Theory: 32 Lectures; Tutorial:15 h)
Unit - I   Introduction to e-commerce: Electronic commerce, scope of Electronic commerce, features of e-commerce, benefits and limitations of e-commerce, e-business, difference between e-commerce and e-business.

Unit - II Business strategy in an electronic age: Value chain, supply chain, Porter's value chainmodel, inter organizational value chains, Competitive advantage, and competitive strategy. Porter's model, First mover advantage, Competitive advantage using e-Commerce.

Unit - III Applications of e-commerce: Direct marketing and selling, value Chain integration,supply chain integration, corporate Purchasing, home shopping, travel, on-line payment, Impact of e-commerce, security issues in e-commerce and Payment settlement system.

Unit - VI Classification of e-commerce: Classifications, barriers toe-commerce,

Unit - V Electronic market: Markets, electronic markets, usage of Electronic markets,advantages and disadvantages of Electronic market.

Unit – VIElectronicdata   interchange(EDI):   definition,benefits,   EDITechnology,   EDI   Communications, EDI implementations, EDI security.

SEMESTER III

III. CORE COURSE : CC8 (MCACC308)   (Credit : Theory– 05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100Pass Marks (SIA : 17 + ESE : 28) = 45

Instruction to Question Setter Mid Semester

Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.

End Semester Examination (ESE):

There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations

       The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks;

DATA SCIENCE USING PYTHON Theory: 60 Lectures; Tutorial: 15 Hours

Unit I- Introduction: Keywords and Identifiers, Statements & Comments, Variables, Datatypes, Type Conversion, I/O and Import, Operators, Namespace

Unit II- Control Statement : if.else, for loop, while loop, break and continue, functions, function arguments, recursion, anonymous function, global, local and nonlocal, global keyword, modules, package

Unit III - Datatypes: Numbers, List, Tuple, String, Set, Dictionary, Files - File Operation, Directory, Exception, Exception Handling, User-defined Exception, Object & Class - OOP, Class, Inheritance, Overloading, Advanced Topics - Iterator, Generator, Closure, Decorators, Property, RegEx, Datetime Module

Unit IV- Data Processing: Data Operations, Data cleansing, Processing CSV Data, JSON Data, XLS Data, Relational Databases, NoSQL Databases, Data Wrangling, Data Aggregation, HTML Pages, Unstructured Data, Word tokenization, Stemming and Lemmatization

Unit V- Visualizing Data: Matplotlib, Barcharts, Line Charts, Scatterplots, Linear Algebra: Vectors, Matrices.

Unit VI- Statistics and Probability: Describing a Single Set of Data, Central Tendencies,

Dispersion, Correlation, Simpson's Paradox, Hypothesis Testing, Confidence Interval,

P-Hacking : Running A/B Test Dependence and Independence, Conditional Probability,

Baye's Theorem, Random Variables, Distribution: Continuous and Normal Distribution. Central Limit Theorem. Linear Regression, Multiple Regression, Goodness of Fit. Using statistics module of python

Unit VII- Gradient Descent: Idea Behind Gradient Descent, Estimating the Gradient Descent, Using the Gradient Descent, Choosing The Right Step Size, Stochastic Gradient Descent.

Unit- VIII - Data: Stdin and Stdout, Reading the Files, Basics of Text Files, Delimited Files, Scrapping the Web HTML and Parsing Using APIS JSON and XML. Working With Data Exploring One Dimension, Two and Multi Dimension Data, Dimensionality Reduction.

Reference Books:

1. Mark Lutz , Programming Python, O'reilly
2. Joel Grus , Data Science from Scratch, O'reilly
3. Jake Vander Plas , Python Data Science Handbook, O'reilly
4. Wes McKinney, Python for Data Analysis, O'reilly

Wickham H. &Grolemund G., R for Data Science: import, tidy, transform, visualize, and model data, O' Reilley Media, Inc

SEMESTER III

III. CORE COURSE : CC 9 (MCACP309)   (Credit : Practical– 05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100
Pass Marks (SIA : 17 + ESE : 28) = 45
Instruction to Question Setter for
Semester Internal Assessment (SIA):
There will be **two** questions in Practical Examination of 3Hrs.out of which **any one** is to be answered. The questions in practical examination will be of equal to 20 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce.
End Semester Practical Examination (ESE Pr):
Lab: There will be **four** questions in Practical Examination of 3Hrs.out of which **any two** are to be answered. Student haveto Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.
The questions in practical examination will be of equal to 50 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.
Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e.
front page+ acknowledgment + index) & Bibliography may be printout. No Xerox copy is allowed.

LAB BASED ON PYTHON   **Practical: 60 Lectures; Tutorial: 15 Hours**

Programming based on the following: -

1. Data types, Variables and Other References, Expression and Operators,
2. Numeric Operations, Sequence Operations, Strings, Tuples, List, Set Operations, Dictionary Operations,
3. The print, Control Flow Statements, while, for, break, continue for, pass try, raise, with
4. Functions, lambda expressions, generators, attributes.
5. Classes and Instances, bound, unbound, overriding, superclass Methods, Decorators, Metaclasses.
6. Try, raise, with exceptions, Exceptions objects, Standard and custom Exception classes.
7. Units, Import, from, import*, statements, Python built-in Units sys, copy, Collections Unit, Functional Unit, Bisect Unit, Heapq Unit, User Dict Unit, Optparse Unit, Itertools Unit.
8. Methods of String Objects, String Unit, String Formatting, Pprint Unit, Repr Unit, Unicode, Regular Expressions and the Re Units.
9. File and Text Operations: Creating a Files object with open, Auxiliary Unit for File I/O, The String IO and cString IO Units, Text Input and Output, Richer-Text I/O, Interactive Command Sessions, Internationalization.
10. Persistence and Databases: marshal, pickle, any dbm Unit, The Python Database API
11. Time Operation: time, datetime, pytz, dateutil, sched, calender, mx. Date Time Unit.
12. Controlling Execution: exec Statement, co, _code, co_filename, code_object, gc Unit, weakref, proxy, register.
13. Thread and Processes: thread, Queue, Threading, map Unit.
14. Numeric Processing: The math and cmath Unit, operator Unit, Random and Pseudorandom numbers, Decimal, gmpy Unit.
15. Array Processing: array Unit, extensions for Numeric Array Computation, Numeric Package, Array Objects, Universal Functions (ufuncs), Auxiliary Numeric Units.

Reference Books:

1. Alex Martelli, Python in A Nutshell, O'REILLY, 2ND Edition, 2012
2. Mark Lutz , Programming Python, O'reilly
3. Wes McKinney, Python for Data Analysis, O'reilly

SEMESTER IV

IV : CORE COURSE: CC10 (MCACC410)   **(Credit : Theory– 05)**
Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100Pass
Marks (SIA : 17 + ESE : 28) = 45
Instruction to Question Setter for
Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.

End Semester Examination (ESE):

There will be two groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations. The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA. (Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

COMPUTER GRAPHICS   Theory: 60 Lectures; Tutorial: 15 Hours

Unit I: Graphics Hardware And Input Devices: Hardcopy and Display Technologies, Raster ScanDisplay Systems, The Video Controller, Random Scan Processor, Input Devices for Operator Interaction, Image Scanners. Interaction Techniques and Interaction Tasks: Interaction Hardware, BasicInteraction Tasks, Composite Interaction Tasks.

Unit II- Introduction: Basic Raster Graphics Algorithms for Drawing 2D Primitives, Scan Converting Lines, Circles, Elipses, Filling Rectangles, Polygons, Ellipse, Pattern Filling, Clipping In Raster World-(Lines, Circles, Elipses, Polygons) , Antialia

Unit III - Geometrical Transformation: 2D Transformations, Homogeneous Coordinates and MatrixRepresentation of 2D Transformation, Composition of 2D Transformation, The Windows-To-View Port Transformation, Efficiency.

Unit IV-3D Transformation: Matrix Representation of 3D Transformation, Composition of 3D Transformation, Transformation As a Change in Coordinate System.

Unit VI- Viewing In 3D: Projections, Specifying an Arbitrary 3D View, Examples Of 3D Viewing ,The Mathematics Of Planar Geometric Projections ,Implementing Planar Geometric Projection and Coordinate Systems.

Unit VII- Achromatic And Coloured Light: Achromatic Light, Chromatic Colour, Colour Models for Raster Graphics, Reproducing Colour, Using Colour in Computer Graphics.

Unit VIII: Visible-Surface Determination: Functions of Two Variables, Techniques for EfficientVisible-Surface Algorithms, Algorithms for Scan-Line Determination, The Z-Buffer Algorithms, List-Priority Algorithms, Area-Subdivision Algorithms, Algorithms for Octress.

Reference Books:
1. D.Hearn And M.P.Baker, Computergraphics, PHI
2. J.D.Foley, A. Vann Dam, S.K. Feiner And J.F. Hughes, Computer Graphics: Principles And Practices
3. D.F.Rogerrs and A.J. Admas, Mathematical Elements in Computer Graphics.

SEMESTER IV

ELECTIVE COURSE: EC - 3(MCAEC403)   (Credit : Theory– 05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100Pass Marks (SIA : 17 + ESE : 28) = 45

Instruction to Question Setter

Mid Semester Examination (MSE):

There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.

End Semester Examination (ESE):

There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations

The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd. 5

A. IPR WITH INTRODUCTION TO MODERN TECHNOLOGIES

(Theory: 60 Lectures; Tutorial: 15 Hours)

Intellectual Property Rights (IPR): Introduction – Definition & Scope of Intellectual Property Right (IPR), **Types of IPR:** Copyright, Patent, Trademark, Design, Geographical indication, **Copyright:** Concept of copyright as a protection under the IPR, The idea and expression Dichotomy, Copyright in Original and Derivative Works, Moral Rights, Concept of Ownership, Authorship and Joint Authorship of Copyright, Assignment, License and Registration, Types of plagiarism & tools to check plagiarism

Emerging Issues and Management of IPR: IPR relationship with software and technology, Challenges for IP in digital economy, e- commerce.

Mobile Computing: Introduction, architecture, cells, GSM architecture

Cloud Computing: Benefits And Need For Cloud Computing - Business And IT Perspective - Cloud And Virtualization - Cloud Services Requirements - Cloud And Dynamic Infrastructure - Cloud Computing Characteristics Cloud Adoption, Cloud Models - Security In A Public Cloud Public Versus Private Clouds, Information Storage, Retrieval, Archive And Protection - Cloud Analytics Testing Under Cloud - Information Security - Virtual Desktop Infrastructure - Storage Cloud. Resiliency – Provisioning - Asset Management - Cloud Governance - High Availability And Disaster Recovery - Charging Models, Usage Reporting, Billing And Metering

Internet of Things: Definition and Characteristic, Physical Design- Things in IoT, IoT Protocols; Logical Design- IoT Functional Blocks, IoT Communication Models and APIs; IoT Enabling Technologies- Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems; IoT Levels & Deployment Templates.

Data Science: regression analysis, frequent patterns, association and correlation, classification (decision tree, Bayesian belief network, SVM, K-nearest neighbour) clustering analysis and outlier detection

Fundamentals of Neural Networks: Basic Concepts of Neural Networks, Human Brain, Model of an Artificial Neuron, Neural Network Architectures, Characteristics of Neural Networks, Learning Method.

Fuzzy Logic: Fuzzy Set Theory, Fuzzy versus Crisp, Crisp Set, operations on Fuzzy Set, alpha cut, Fuzzy Relations. Arithmetic operations on fuzzy numbers, defuzzification methods

Genetic Algorithm: Creation of offspring, Working Principle, Encoding, Fitness Function, Reproduction.

B. NUMERICAL AND STATISTICAL METHODS
Theory: 60 Lectures; Tutorial: 15 Hours
GROUP A NUMERICAL METHODS
Unit I- Errors in Numerical Calculations: Errors & Their Computation-Absolute, Relative & Percentage. Solution of Algebraic & Transcendental Equations: Introduction, Bisection Method, Iterative Method, False Position Method, Newton's Raphson Method, Lin Bairstows Method, Error Analysis & Convergence Study.
Unit-II Interpolation With Equal & Unequal Intervals: Introduction, Finite Differences-Forward, Backward & Central, Difference Tables, Differences of Polynomials, Newton's Formula for Interpolation, Gauss's Central Difference Interpolation Formula, Divided Difference & Their Properties-Newton's Divided Differences Formula, Lagrange's Interpolation Formula, Inverse Interpolation
Unit-III Numerical Differential & Integration: Introduction, Derivatives Using Forward & Backward Difference Formula, Numerical Integration-Trapezoidal Rule, Simpson's 1/3 & 3/8 Rules Weddle's Rule.
Unit IV- Numerical Solution Of Linear System Of Equations: Direct Method-Gauss Elimination, Guass-Jordan, LU Decomposition Methods. Iterative Methods-Gauss-Jacobi & Gauss Seidel Methods.
Unit V- Numerical Solution Ordinary Differential Equations: Taylor Series Method, Euler's Method, Modified Euler's Method, Runga-Kutta Methods Of 2nd& 4th Order, Predictor-Corrector Methods (Milne's Method And Adam's Methods).

GROUP B STATISTICAL METHOD
Unit VI – (a)Concept Of Probability: Experiment And Sample Space, Events And Operations With Events, Probability Of An Event, Basic Probability Rules, Application Of Probability Rules, Conditional Probability.
(b)Random Variables: How Random Variable Arise, Probability Distribution, Mean or Expected Value, Probability Histogram, Variance and Standard Deviation.
Unit-VII- Discrete and Continuous Distribution: Structure of a Binomial Experiment, Binomial Probability Distribution, Use of Binomial Probability Table.
Normal Curve and Normal Distribution: Motivation behind a Normal Curve, Properties of a Normal Curve, Normal Probability Distribution, Areas under a Normal Curve.
Application of the Normal Distribution: Approximating a Binomial Probability, The Normal Theorem, Central Limit Theorem.

Reference Books:

1. S.S Shastry Introductory Methods of Numerical Analysis, PHI

2. Kendall E.Atkinson , An Introduction to Numerical Analysis, Wiley

3. Dr.B.S. Goyel, Dr.S.K.Mittal , Numerical Analysis, Pragati Prakashan

4. Quazishoeb Ahmed, Numericals and statistical Techniques, Ane Books Pvt. Ltd

C. MANAGEMENT FOR IT INDUSTRIES

Theory: 60 Lectures; Tutorial: 15 Hours

Unit I- Introduction : Nature & Concept of Management; Evolution of Management Thought; Concept of Functional Management; Management Styles, Productivity Measurement, Productivity Index, Types of Production System.

Unit II- Human Resource Management: Definition and Theories of Managing People for IT Industry, Human Resource Planning, Responsibility Assignment Matrix, Resource Management, Developing and Managing the Project Team, Case Studies

Unit III- IT Industry Supply Chain Management: Types, Business Processes, Strategic, Tactical and Operational Decisions in Supply Chains, Performance Measures, Inventory Management, Bullwhip Effect, E-Marketplaces, E-Procurement, E-Logistics, E-Fulfillment, Customer Relationship Management, Web Services, ERP and Supply Chains, Case Studies

Unit IV- IT Project Quality Management: Tools and Techniques for Quality Control (Pareto Analysis, Statistical Sampling, Testing), Process Control, SQC Control Charts, Single, Double And Sequential Sampling, TQM. ,CMM, ISO, Six Sigma ,Case Studies

Unit V - Introduction to Management Information System (MIS): Meaning and Definition of MIS, Objectives and Need of MIS, Role & Importance of MIS, Types of Information System, Decision Making with MIS, Development of MIS, MIS in Organisation – IT Interaction Model, MIS in Internet Era.

Unit VI- Environmental Acts: Environmental Issues, Pollution Control Acts, Green IT Practices, Establishing a Green IT Action Plan, Techniques and Technologies available to enable Green IT Case Studies

Reference Books:

- Koontz and Weihrich , Management :Global Perspectives,
- Prasad, L.M., Principles and Practices of Management, Sultand Chand & Sons
- Michael Hugos, Essential of Supply Chain Management, 4th Edition, Wiley Publication
- Jyothi, Human Resource Management, University Press
- Noe, Hollenbeck, Gerhart & Wright, Fundamentals Of Human Resource Management, 7th Edition, McGraw Hill Publication India
- Sahil Raj. Management Information System, 2nd Edition, Pearson Publication
- Giridhar Joshi, Management Information System, Oxford University Press, India
- Sharma B.R., Environmental and Pollution Awareness by

D. CLOUD COMPUTING Theory: 60 Lectures; Tutorial: 15 Hours

Unit I- Introduction: Essentials, Benefits And Need For Cloud Computing - Business And IT Perspective - Cloud And Virtualization - Cloud Services Requirements - Cloud And Dynamic Infrastructure - Cloud Computing Characteristics Cloud Adoption.

Unit II- (a) Cloud Models: Cloud Characteristics - Measured Service - Cloud Models - Security In A Public Cloud Public Versus Private Clouds - Cloud Infrastructure Self Service.

(b) Cloud As A Service: Gamut Of Cloud Solutions - Principal Technologies - Cloud Strategy Cloud Design And Implementation Using SOA - Conceptual Cloud Model - Cloud Service Defined.

Unit III- Cloud Solutions: Cloud Ecosystem - Cloud Business Process Management – Cloud Service Management - Cloud Stack - Computing On Demand (Cod) – Cloud Sourcing.

Unit IV- Cloud Offerings & Management : Information Storage, Retrieval, Archive And Protection - Cloud Analytics Testing Under Cloud - Information Security - Virtual Desktop Infrastructure - Storage Cloud. Resiliency – Provisioning - Asset Management - Cloud Governance - High Availability And Disaster Recovery - Charging Models, Usage Reporting, Billing And Metering.

Unit V- Cloud Virtualization Technology: Virtualization Defined - Virtualization Benefits - Server Virtualization - Virtualization For X86 Architecture - Hypervisor Management Software - Logical Partitioning (LPAR) - VIO Server - Virtual Infrastructure Requirements. Storage Virtualization - Storage Area Networks - Network-Attached Storage - Cloud Server Virtualization - Virtualized Data Center.

Unit VI- Cloud And SOA: SOA Journey To Infrastructure - SOA And Cloud - SOA Defined-SOA and Iaas - SOA-Based Cloud Infrastructure Steps - SOA Business And IT Services.

Unit VII- Cloud Infrastructure Benchmarking: OLTP Benchmark - Business Intelligence Benchmark - E-Business Benchmark - ISV Benchmarks - Cloud Performance Data Collection And Performance Monitoring Commands - Benchmark Tools.

Reference Books:

1. K. Saurabh, Cloud Computing, Wiley India, 2ndEdition, 2014.

2. T. Velte, A. Velte and R. Elsenpeter, Cloud Computing: A Practical Approach, McGraw Hill, India.

3. R. Buyya & J. Broberg, Cloud Computing: Principles and Paradigms, Wiley.

4. Derrick Rountree & Leana Castrillo – The Basics of Cloud Computing, Syngress

5. Arshdeep Bahga & Vijay Madisetti, Cloud Computing: A Hands on Approach, Universities Press

SEMESTER IV

ELECTIVE COURSE: EC – 4 (MCAEC404)   · (Credit : Theory– 05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) = 100

Pass Marks (SIA : 17

<u>Instruction to Question Setter</u>

<u>Mid Semester Examination (MSE):</u>

There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.

<u>End Semester Examination (ESE):</u>

There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations

The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5

A.   AUTOMATA THEORY   (Theory: 60 Lectures; Tutorial: 15 Hours)

Unit I- Finite Automata : Finite Automata, capability & limitations of FSM, Deterministic Finite Automata , Non-Deterministic Finite Automata, NFA with e-moves, regular sets & regular expressions, Equivalence of DFA and NDFA, NFA from regular expressions, regular expressions from DFA, Moore versus Mealy m/c , Kleen's Theorem.

Unit II- Regular Languages & Regular Grammars: Regular Expressions- Formal Definition& Language associated with It. Criterion for Regularity, Relation between Regular expression & Regular Language, Closure properties of Regular Grammar. Identifying Nonregular Language using Pigeonhole Principle, Pumping Lemma.

Unit III - Context Free Grammars : Introduction, Definition, Regular Grammar, Derivation trees, Ambiguity, Simplified forms and Normal Forms, Applications.

Unit IV- Pushdown Automata : Definition, Moves, Instantaneous Descriptions,
Language recognised by PDA, Deterministic PDA, Acceptance by final state & empty stack, Equivalence of PDA , Pumping lemma for CFL, Interaction and Complements of CFL,Decision algorithms.

Unit V- Turing Machines: Definition and examples, Computing Partial Functions with Turing Machine(TM), Combining TMs, Variations of TMs, Multi-tape TMs, Nondeterministic TM, Universal TM, Church Thesis.

Unit VI- Recursively Enumerable Languages: Recursively Enumerable and Recursive, Enumerating Language, Context Sensitive and Chomosky Hierarchy.

Unit VII - Unsolvable Problems and Computable Functions: Nonrecursive Language and unsolvable Problems, Halting Problem, Rice Theorem, Post Correspondence Problem.

Reference Books:

1. Hopcroft JE. And Ullman JD, Introduction to Automata Theory, Languages & Computation, Narosa..
2. K.L.P Mishra & N. Chandrasekharan , Theory of Computer Science, PHI
3. Peter Linz , An Introduction to Formal Language And Automat, Narosa
4. C.K. Nagpal, Formal Language & Automata Theory, Oxford University Press
5. Vivek Kulkarni, Theory of Computation, Oxford University Press
6. DasradhRamaiah K., Introduction to Automata Theory & Compiler Design, PHI

B. ENTERPRISE RESOURCE PLANNING (Theory: 60 Lectures; Tutorial: 15 Hours)

Unit I- Introduction to ERP: Evolution of ERP, What is ERP, Reasons for the growth of the ERP market, Advantages of ERP, Reasons of Failure.

Unit II- Enterprise An Overview: Integrated Management information, Business Modeling, Integrated Data Model.

Unit III- ERP and Related Technologies: BRP (Business Process Reengineering), MIS (Management Information System), DSS (Decision Support System), EIS (Executive Information system), OLAP, Supply Chain Management.

Unit IV- A Manufacturing Perspective: ERP, CAD/CAM, MRP (Material Requirement Planning), Bill of Material, Closed loop MRP, MRP-II, DRP (Distributed Requirement Planning),

Unit V- Product Data Management: Product Data Management, Data Management, Benefits of PDM, ERP Units, Finance, Plant Maintenance, Quality Management, Material Management.

Unit VI- Benefits of ERP & ERP Market: SAP, BAAN, Oracle Corporation, People Soft.

Unit VII- Vendors, Consultants & Users: In – house Implementation – pros & cons, Vendors, Consultants, End-users. ERP Implementation Life Cycle, ERP Case Studies.

Reference Books:

1. Alexis Leon , Enterprise Resource Planning, TMH Fourth Reprint 2001.
2. Bret Wagner Ellen F. Monk, Enterprise Resource Planning, Cengage Learning, 3rd Edition
3. Marianne Bradford, Modern ERP, Lulu.com, 3rd Edition
4. Brian Linuma & Eric Klauss , Enterprise Resource Planning Systems
5. Mary Summer, Enterprise Resource Planning, Pearson, 1st Edition

C. MOBILE COMPUTING WITH ANDROID SYSTEM

Theory: 60 Lectures; Tutorial: 15 Hours

Unit I- Introduction: Fundamentals of Mobile App Development, Identifying Various Mobile Platforms. Identifying Various Mobile Development Environments, Exploring the Android Platform, Exploring the Android Architecture, Identifying the Building Blocks of an Android App, Exploring the Android Development Environment, Designing the UI

Unit II- Event Handling and Data Storage: Viewing the UI on a Device, Handling UI Events in the Activity Class, Activating App Components, Introducing Android Debugging Environment, Debugging Apps from Eclipse with ADT Plug-in, Using ADB, Identifying Data Storage Mechanisms, Using an SQLite Database for Data Storage, Using Content Providers for Data Access, Creating Tabs, Applying Styles and Themes, Customizing Views

Unit III-Shared Preferences and Services: Using Native Content Providers, Using Internal Data Storage, Using External Data Storage, Using Shared Preferences, Creating Shared Preferences, Retrieving Shared Preferences, Working with Services, Implementing Services, Working with Broadcast Receivers, Creating Menus, Creating Tabs, Applying Styles and Themes, Customizing Views

Unit IV- Features and Map based services: Using Notifications, Creating Alarms, Identifying Location-based Services, Selecting a Location Provider, Implementing Location-based Services in an Emulator, Creating Map-based Apps

Unit V-Working with Graphics, Audio and Video: Working with Graphics, Adding the Audio and Video Elements, Identifying the Security Model of the Android Platform

Unit VI –Deployment : Using Permissions for Specific Operations, Deploying an Android App, Identifying Deployment Considerations, Publishing an Android App

Reference Books:

1. Prasant Kumar Pattnaik & Rajib Mall, Fundamentals of Mobile Computing, PHI. 2nd Edition

2. Ashok K. Talukder, Hasan Ahmed & Roopa R. Yavgai, Mobile Computing: Technology Applications and Service Creation, 2nd Edition

3. Raj Kamal, Mobile Computing, Oxford

4. Reto Meier, Professional Android Application Development, Wrox Publication

5. Uwe Hansmann, Lother Merk, Martin Nicklous & Thomas Stober, Principles of Mobile Computing, 2nd Edition, Springer

D. INTERNET OF THINGS (Theory: 60 Lectures; Tutorial: 15 Hours)

Unit I- Introduction and Concepts : Definition and Characteristic, Physical Design- Things in IoT, IoT Protocols; Logical Design- IoT Functional Blocks, IoT Communication Models and APIs; IoT Enabling Technologies- Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems; IoT Levels & Deployment Templates.

Unit II- Introduction, Home Automation: Smart Lighting & Appliances, Intrusion Detection, Smoke/Gas Detectors; Cities- Smart Parking, Smart Lighting & Roads, Structural Health Monitoring, Surveillance, Emergency Response; Environment- Weather Monitoring, Air Pollution Monitoring, Noise Pollution Monitoring, Forest Fire Detection, River Floods Detection; Energy- Smart Grids, Renewable energy Systems, Prognostics;

Unit III – Retail: Inventory Management, Smart Payments, Smart Vending Machines; Logistics- Route Generation & Scheduling, Fleet Tracking, Shipment Monitoring, Remote Vehicle Diagnostics; Agriculture- Smart Irrigation, Green House Control; Industry- Machine Diagnosis & Prognosis, Indoor Air Quality Monitoring; Health & Lifestyle- Health & Fitness Monitoring, Wearable Electronics;

Unit IV- IoT & M2M: Introduction, M2M, Differences between Iot and M2M, SDN (Software Defined Networking) and NFV (Network Function Virtualization) for Iot

Unit V – (a) IoT System Management with NETCONF-YANG: Need for IoT Systems Management, Simple Network Management Protocol (SNMP)- Limitations; Network Operator Requirements, NETCONF, YANG, NETOPEER.

(b)IoT Platforms Design Methodology: Introduction, IoT Design Methodology, IoT System for Weather Monitoring

Unit VI- IoT Physical Devices and Endpoints: Basic Building Block of IoT Device, Exemplary Device, Linux on Raspberry Pi, Raspberry Pi Interfaces- Serial, SPI, I2C; Programming Raspberry Pi with Python- Controlling LED with Raspberry Pi, Interfacing LED & Light Sensor(LDR) and Switch with Raspberry Pi; Other IoT Devices- pc Duino, Beagle Bone Black, Cubie board

Unit VII- IoT Physical Servers and Cloud Offerings: Cloud Storage Models & Communication APIs, WAMP Auto Bahn for IoT, Xively Cloud for IoT, Python Web Application Framework- Django Architecture, Starting Development with Django; Designing a RESTful Wen API, Amazon Web Services for IoT- EC2, Auto Scaling, S3, RDS, Dynamo DB, Kinesis, SQS, EMR; Sky Net IoT Messaging Platform.

Unit VIII- Illustrating IoT Design : Introduction, Home Automation- Smart Lighting, Home Intrusion Detection; Cities- Smart Parking; Environment- Weather Monitoring System, Weather Reporting Bot, Air Pollution Monitoring, Forest Fire Detection; Agriculture- Smart Irrigation; Productivity Application- Iot Printer.

Reference Books:

1. Arshdeep Bahga & Vijay Madisetti- Internet of Things: A hands-on Approach, 2015, Universities Press

2. T. Balaji , Introduction to Internet of Things(IoT) and Its Applications, T. Balaji

3. Jeeva Jose, Internet of Things, Khanna Publishing

4. An Introduction to Internet of Things, Cengage Publication

SEMESTER IV

IV. PROJECT/ INTERNSHIP: **(Credit : Theory– 05)**

Marks : 70(OJT) + 30 (Viva)   **Pass Mark : 45**

Guidelines to Examiners for End Semester Examination (ESE):

Overall project dissertation may be evaluated under the following heads:

- Motivation for the choice of topic
- Project dissertation design
- Methodology and Content depth
- Results and Discussion
- Future Scope & References
- Participation in Field Training Program
- Application of Research technique in Data collection
- Report Presentation
- Presentation style
- Viva-voce

	Distribution of Marks	
S.No.	**Particulars**	**Marks**
I.	**OJT Project Report by External:**	
	1. Formulation of Project Design	25
	2. Implementation of the Design	25
	3. Presentation of Report	20
	Total	**70**
II.	**Report Preparation and Internal Presentation**	
	1. Presentation of Report	20
	2. Internal Assessment	10
	Total	**30**
	TOTAL (I + II)	**100**

Note: There will be only one external examination for this paper.

FINAL PROJECT/ INTERNSHIP

A.On Job Training (OJT):

1. OJT is **ON JOB TRANING**. Student have to do Six Weeks (**OJT Six Weeks**) industrial Training from IT organisation (**Reference letter for OJT must be issued from MCA Department**). Student has to produce daily report. In this daily report, Attendance sheet, Work culture and working hour list, day by day, must be listed.

2. Student alone or in a group of not more than three, shall undertake **One Project Dissertation** approved by the Subject Teacher/Director. of the Department concerned. The progress of the Project Dissertation shall be monitored by the faculty members at regular intervals, and followed by Internal assessment of 30 marks.

B. Academic Credits For Training Shall Be Based On Following:

A **Powerpoint presentation** (based on the report) for duration of **10/15 minutes** should be presented. This will be presented in front of external / internal examiners. Marks will be awarded on the basis of his/her presentation, dissertation submitted to the faculty coordinator and viva-voce conducted by the external/ internal examiners.

Students Have to Submit the Following on Completion of Training to the Concern Faculty at the Department/Institute:

1. Synopsis submission
2. Synopsis Approval will be given within a week from the date of submission.
3. Synopsis will be approved by concerned department faculty member.
4. Faculty members will be the internal supervisor of particular student/ group of Students.
5. The group size will be maximum of 3 candidates.
6. Group will make power point presentation in front of panel and submit the project status report within 15 to 20 days from the date of approval.
7. Final Project Submission contains Hard copy (Two Copy), Soft copy & leave letter.

Project Hard Copy Contains

     a) Front page
     b) Certificate of Authenticity
     c) Certificate of job Training
     d) Declaration
     e) Acknowledgement
     f) Table of content/index
     g) Project guidelines (These points are mandatory)

(i).	Introduction with Company profile.
(ii).	Vision, mission & objective.
(iii).	SWOT Analysis.
(iv).	Chronology of Achievements.
(v).	Topic introduction & discussion.
(vi).	Its relevance & implication in company.
(vii).	Findings.
(viii.	Conclusion
(ix).	Further enhancement (Suggestion).
(x).	Bibliography
(xi).	Reference Website
(xii).	CD (compact Disc)

The Training / Project Report will be submitted in the specified form as under:

a. The typing should be done on both sides of the paper(instead of single side printing)
b. The font size should be12 with Times New Roman font.
c. The Training/ Project Report may be typed in 1.5 line spacing.
d. The paper should be A-4size.

Two copies meant for the purpose of evaluation may be hard bound in paper and submitted to the approved authority of the department/institute.