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शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४.
दुरध्वनि (ईपीएबीएक्स) २६०९००० विस्तारीत . २६०९०१४)
फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.
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" A" Re- accredited By NAAC (2014) with CGPA-3.16

Ref. No./SU/BOS/Commerce /MCA/2235 Date -16-06-2015

The Director, Department of Commerce (M.C.A.) Shivaji University, Kolhapur	The Principal, All Affiliated M.C.A. Colleges Shivaji University, Kolhapur

Subject: Regarding revised Syllabi, Nature of Question Paper and Equivalence of M.C.A. Part-II (Semester-III & IV) under the Faculty of Commerce.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi of Master of Computer Application Part-II (Semester-III & IV) under the Faculty of Commerce.

This syllabi will be implemented from the academic year 2015-16 (i.e. from June 2015) onwards. A soft copy (C.D.) containing the syllabus is enclosed herewith. This syllabi is also available on university website www.unishivaji.ac.in.

Further, it is hereby informed that the syllabi, pattern of examination & Credit System shall be the same for the University Department & Affiliated Colleges. The question papers on the pre-revised syllabi of above mentioned Course will be set for the examinations to be held in Oct/November 2015 , March/April 2016, Oct/November 2016 & March/April 2017. These chances are available for repeater students, if any.

You are therefore requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,
Sd/-
Dy. Registrar

Encl: -As above.

Copy to:-

1. Dean, Faculty of Commerce
2. Chairman, Board of Studies in Business Management — For information
3. Appointment Section
4. Other Exam--35
5. Affiliation Section (P.G.)
6. Computer Centre
7. P.G. Admission
8. Meeting Section
9. P.G.Seminar
10. Eligibility Section — For information & necessary action.

SHIVAJI UNIVERSITY, KOLHAPUR

Master of Computer Application (M.C.A.)

(Under The Faculty of Commerce)

(Choice Based Credit System)

(Introduced from June 2015 and Onwards)

To be implemented from the academic year 2015-2016

1. Introduction

1. The name of the programme shall be **Master of Computer Application** (MCA) Integrated.

2. The knowledge and skills required planning; designing and to build Complex Application Software Systems which are highly valued in all industry sectors including business, health, education and the arts. The basic objective of the education in Masters Programme as Computer Applications (MCA) is to provide to the country a steady stream of the necessary knowledge, skills and foundation for acquiring a wide range of rewarding careers into the rapidly expanding world of the Information Technology.

3. **Job Opportunities:** Many graduates begin their career as a junior programmer and, after some experience, are promoted as system analysts. Other seek entrepreneurial role in the Information Technology world as independent business owners, software authors, consultants, or suppliers of systems and equipments. Career opportunities exist in such areas as management software and hardware sales, technical writing, training others on computer, consulting, software development and technical support.

Application areas include transaction processing, accounting functions, sales analysis, games, forecasting and simulation, database management, decision support and data communications.

4. Specific elective courses to be offered in functional areas have to depend on student preferences and needs of the user systems in the region in which the educational institution is located.

5. The MCA programme is a mixture of computer-related and general business courses. The computer related courses includes standard techniques of programming, the use of software packages, databases and system analysis and design tools. The general business courses include the functional areas of management like accounting, sales, purchase, inventory, and production. The course would emphasis the study and creation of business applications. Inclusion of projects in each semester (Except Sem-I) improves student's technical orientation, understanding of IT environment and domain knowledge. It will build right platform for students to become a successful Software professional. This would emphasize on domain knowledge of various areas, which would help the students to build software

applications on it. The students are exposed to system development in the information-processing environment with special emphasis on Management Information Systems and Software Engineering for small and medium computer systems. Inclusion of Business Management Labs will help students to acquire thorough knowledge of management practices in organization. Subjects such as ERP, Information Security and Business Intelligence will work as new application domains. Major focus is also given on Mobile technologies so that student can choose Mobile Technologies as their career options.

Also, exposure to microcomputer technology, micro-based systems design and micro applications software, including network and graphical user interface systems is also provided.

Advanced Internet and Web technology includes variety of new technologies. Soft skills techniques are covered in first four semesters, which will lead to overall personality development of the student and that will help them in their placement activities and to sustain in the organization successfully.

6. The new curricula would focus on learning aspect from three dimensions viz. Conceptual Learning, Skills Learning and Practical / Hands on.

7. The inclusion of projects at each semester (except Sem-I) ensures the focus on applying the skill learnt at respective levels. It will enhance student's capability to work on various technologies. It will make appropriate platform for students to work in IT Industry. It will also improve documentation, Coding and Design standards in students. Inclusion of project for subject such as Mobile Computing will definitely improve student's innovativeness and creativity. Student's technical orientation, eagerness will be enhanced.

8. The Institutes should organize placement programme for the MCA students, by interacting with the industries and software consultancy houses in and around the region in which the educational Institution is located.

9. At the end of the syllabus various certifications possible for each Semester is given in the list. Students should try to do maximum certifications in their learning phase only to make their resume rich.

10. Ordinarily, in each class, not more than 60 students will be admitted.

2. Duration of the Course

The MCA is integrated programme and will be a **full-time three years** i.e. 6 semesters. Pattern of examination will be Semester System.

3. Medium of Instruction

The medium of Instruction will be English only.

4. Admission Procedure

(A) Eligibility

The eligibility criteria for appearing to MAH-MCA-CET conducted by DTE and CET conducted by Management Association of MCA Institutions (MAMI), and admission for the MCA course will be as decided by the Competent Authority

(Directorate of Technical Education Maharashtra State, Mumbai &/or AICTE, New Delhi) every year.

(B) Reservation of Seats

As per rules of by the Competent Authority

(C) Selection Basis

The selection would be done as per the guidelines given by the Directorate of Technical Education Maharashtra State time to time.

5. Course Structure

Lectures and Practical should be conducted as per the scheme of lectures and practical indicated in the course structure.

Semester – III						
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**	**Workload per Week**	
					T	**P**
17	MCA301	Data Communication and Networks	20	80	4	-
18	MCA302	Java Programming	20	80	4	-
19	MCA303	Data Structure using C++	20	80	4	-
20	MCA304	Research Methodology	20	80	4	-
21	MCA305	Enterprise Resource Planning	20	80	4	-
22	MCA306	Communication Skill-II	50		2	
23	MCA307	LAB V (Java)		100		4
24	MCA 308	LABVI (Data Structure using C++)		100		4
		Total	**150**	**600**	**22**	**8**

Semester – IV						
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**	**Workload per Week**	
					T	**P**
25	MCA401	Mobile Computing	20	80	4	-
26	MCA402	Advance JAVA	20	80	4	-
27	MCA403	Advance Database Technology	20	80	4	-
28	MCA404	Optimization Techniques	20	80	4	-
29	MCA405	Elective I E1.1 Network Security E1.2 Knowledge Management E1.3 Information System Audit E1.4 Social Networking	20	80	4	-
30	MCA406	Mini Project -II		50	-	2
31	MCA407	LAB VII (Advance JAVA)		100	-	4
32	MCA408	LAB VIII (ADBT)		100		4
		Total	**100**	**650**	**20**	**10**

6. Teaching and Practical Scheme

1. Period for teaching or practical should be of 60 minutes each.
2. Minimum 45 periods should be conducted for each subject of 80 Marks.
3. One Practical Batch should be of 30 students.
4. Practical evaluation should be conducted before the commencement of University examination.

7. Project Work

At the end of the sixth semester of study, a student will be examined in the course" Project Work".

1. Project work may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others.

2. Students should take guidance from an internal guide and prepare a Project Report on "Project Work" in **2 copies** to be submitted to the Director of the Institute.

3. The Project Report should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, File designs and a list of output reports should be included.(Refer annexure 1)

4. The project Work should be of such a nature that it could prove useful or should be relevant from the commercial/management angle.

5. The project report will be duly accessed by the internal guide of the subject and internal marks will be communicated by the Director of the Institute to the University.

6. The project report should be prepared in a format prescribed by the University, which also specifies the contents and methods of presentation.

7. The major project work carry 200 marks for internal assessment and 300 marks for external viva. The external viva shall be conducted by a panel of minimum of three external examiners out of which one will be the Chairman of the panel.

8. Project work can be carried out in the Institute or outside with prior permission of the Institute.

9. Project viva-voce by the University panel will be conducted in the month of june after completion of 150 days training.

8. Assessment

The final total assessment of the candidate is made in terms of an internal assessment and an external assessment for each course.

1. For each theory paper, 20% marks will be based on internal assessment and 80% marks for semester examination (external assessment), unless otherwise stated.

2. The division of the 20 marks allotted to internal assessment of theory papers is as follows –

3.

Sr. No.	Internal Marks Distribution (20)	
1	Attendance	5
2	Mid Test	5
3	Preliminary Examination	5
4	Assessment by the Subject faculty (Presentation /Group Activity/ Assignments)	5
	Total→	**20**

4. The mini project will be evaluated by the university appointed panel and submitted to the university by the panel.

5. The final practical examination will be conducted by the university appointed panel at the end of semester for each lab course and marks will be submitted to the university by the panel. The pattern of final practical examination will be as follows-

Sr. No.	Practical Marks Distribution (100)	
1	Coding and Execution of Program	60
2	Viva-voce	20
3	Journal	20
	Total→	**100**

6. The internal marks will be communicated to the University at the end of each semester, but before the semester end examinations. These marks will be considered for the declaration of the results.

9. Examination

The final Examinations shall be conducted at the end of the semester i.e. during November and in May.

10.Nature of question paper:

Nature of question paper is as follows for University end semester examination

a. Theory Examination:

There will be seven (7) questions of 16 Marks and out of which four (4) to be attempted from question no 1 to 6. Question NO.7 is compulsory and is of short answers type. It must consist four (4) sub-question of Eight(8) marks each out of which two (2) to be attempted.

b. Practical Examination:

i. Duration of Practical Examination : 3 Hrs

ii. Nature of Question paper

There will be three questions out of which any two questions to be attempted and each question carries 30 Marks.

11. Standard of Passing

1. Internal as well as external examination will be held at the end of semester. The candidate must score 40% marks in each head of internal as well as external Examination and Aggregate 50% marks are required for passing in each head.(Internal + External)

12. Backlog

1. No candidate will be admitted to Second Year MCA (Sem-III) of the course unless he/she
   i) passes MCA sem-I and Sem- II examination. Or
   ii) fails in not more than three heads of passing at the first year MCA Sem-I and Sem-II examination.
2. No candidate will be admitted to Third Year MCA (Sem-V) of the course unless he/she –
   i) passes MCA sem-I, Sem-II, Sem-III and Sem- IV examination. Or
   ii) passes his MCA Sem-I and MCA Sem-II examination and fails in not more than three heads of passing at the Second year MCA Sem-III and Sem-IV examination.

13. Board of Paper Setters /Examiners

For each Semester and examination there will be one board of Paper setters and examiners for every course. While appointing paper setter /examiners, care should be taken to see that there is at least one person specialized in each unit course.

14. Award of Class

There will be numerical marking on each question. At the time of declaration of the result the marks obtained by the candidate is converted into classes as shown below.

15. Credit system implementation

As per the University norms

16. Clarification of Syllabus

The syllabus Committee should meet at least once in a year to study and clarify any difficulties from the Institutes. The Workshop on syllabi should be organised at the beginning of every semester.

17.Certification

Te students are expected to complete two certifications on latest technology and softskills.

18. Revision of Syllabus

As the computer technology is changing very fast, revision of the syllabus should be considered every 3 years.

<table>
<tr><th colspan="5">Semester - III</th></tr>
<tr><th>Sr. No.</th><th>Subject Code</th><th>Subject Title</th><th>Internal Marks</th><th>External Marks</th></tr>
<tr><td>17</td><td>MCA301</td><td>Data Communication and Networks</td><td>20</td><td>80</td></tr>
<tr><td colspan="5">Objective:</td></tr>
<tr><td>UNIT –1</td><td colspan="4">Data Communication · characteristics of data communication, components, data representation, data flow Computer Networks -· goals and applications
Network Hardware· broadcast and point-to-point
Network Topologies : mesh, star, bus, ring, hybrid
Network Types · LAN, MAN, WAN, Wireless Networks, Home Networks, Internet works,
Protocols and Protocol Hierarchies - · layers, protocols, peers, interfaces, network architecture, protocol stack · design issues of the layers – addressing, error control, flow control, multiplexing and de-multiplexing, routing · Connection-oriented and connectionless service · Service Primitives – listen, connect, receive, send, disconnect · The relationships of services to protocol
Netwok Models -OSI Reference Model -Functionality of each layer
TCP/IP Reference Model - Introduction to IP, TCP, and UDP, TCP/IP Protocol Suite
-Comparison of OSI and TCP/IP model
Addressing --Physical, Logical and Port addresses</td></tr>
<tr><td>UNIT -2</td><td colspan="4">Physical Layer-
Basic Concepts
- Bit rate, bit length, base band transmission
- Transmission Impairments – attenuation, distortion and noise
- Data Rate Limits – Nyquist’s bit rate formula for noiseless channel and Shannon’s law
- Problems on above concepts
Performance of the Network
- Bandwidth, Throughput, Latency(Delay), Bandwidth –Delay Product, Jitter
- Problems on above concepts
Line Coding -Characteristics, Line Coding Schemes – Unipolar, NRZ, RZ, Manchester and Differential Manchester
Transmission Modes-Parallel Transmission,-Serial Transmission – Asynchronous and Synchronous
Transmission Media-Guided Media – Twisted Pair, Coaxial Cable, Fiber Optic Cable, Unguided Media – Radio waves, microwaves, Infrared
Switching -Circuit Switching, Message Switching and Packet Switching</td></tr>
<tr><td>UNIT -3</td><td colspan="4">Data Link Layer
Framing: Character Count, Byte Stuffing, Bit Stuffing and Physical Layer Coding Violations
Error Control -Hamming Code and CRC
Flow Control -Stop and Wait ARQ for noisy channel
Sliding Window Protocols -1-bit sliding window protocols, Go back N, Selective Repeat.
The Medium Access Sub layer</td></tr>
</table>

	Random Access Protocols - ALOHA – pure and slotted - CSMA – 1-persistent, p-persistent and nonpersistent - CSMA/CD ,CSMA/CA **Controlled Access -**Reservation, Polling and Token Passing **Channelization -**FDMA, TDMA and CDMA **VLANS -**Membership, Configuration and Advantages
UNIT -4	**The Network Layer** **Design Issues** - Store-and-forward packet switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection Oriented Service, Comparison of Virtual Circuit and Datagram **Logical Addressing** - IPV4 Addresses – Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation(NAT) - IPV6 Addresses – Addressing Structure, Address Space **IPV4 Protocol** - Datagram Format, Fragmentation, Checksum, Options **IPV6 Protocol** - Advantages, Packet Format, Extension Headers **Transition From IPV4 to IPV6** Dual Stack, Tunneling, Header Translation **The Transport Layer** Process-to-Process delivery, UDP, and TCP. Concepts of congestion control: data traffic, congestion, and congestion control, congestion Control in TCP. **Wireless communication (Bluetooth, Wi-Fi, Wi-MAX)** Cellular Telephone Networks, IPSEC, Firewalls Case Study – Implementation of LAN, Configuration of various connecting Devices.

Reference Books:

Sr.No.	Title	Author/s	Publication	Edition
1	Computer Networks	Andrew Tanenbaum	Pearson Education	
2	Data Communication and Networking	Behrouz Forouzan,	TATA McGraw Hill.	
3	Data Communication and Networks	James Irvin, David Harle	Wiley	
4	Computer Networks protocols, Standards and Interface	Black C.	Prentice Hall of India	
5	Computer Communication Networks	William Stalling	Prentice Hall of India	
6	Delight of Computer Network	Singh K. K.	Schitech	
7	Computer Networks	Sharma C. R.	Jaico	
8	Computer Networks and Internets	Comer D. E.	Pearson	5 st th

Semester – III				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
18	**MCA302**	**Java Programming**	20	80

Objective:
To enable the students to understand the core principles of object oriented approach with the use of Java Language and to produce well designed, effective standalone applications. It will open the path for learning the new tactics in java for enhanced and flexible applications.

UNIT –1	**Introduction:** History of Java, Features of Java, JVM, Java environment and tools (javac, java, applet viewer, javadoc, jdbc), Naming conventions and data types, variable, expressions, operators, and control structures, arrays, string and mutable string. Using collection bases loop for String, Tokenizing a String, Creating Strings using String Buffer and String Builder classes, garbage collection and finalize method. **Introduction to OOP:** Objects and Classes: instance variables and instance methods, constructors, method overloading and constructor overloading, access specifiers, abstract classes, wrapper classes, inheritance in java, single, multilevel, hierarchical, static (variables, methods, block) , final keyword, runtime polymorphism, method overriding, use of super and this keyword. visibility control- public, private, friendly, protected access.
UNIT -2	**Input /Output and File Handling:** exploring java.io, Input streams and Output streams, FileInputStream and FileOutputStream, Binary and Character streams, Buffered Reader/ Writer, Object Serialization and Deserialization. Introduction to file handling, defining & opening a File, closing a File, Input/output operations on Files **Packages and Interfaces:** package concept, creating and importing user defined packag0-e, access control protection, defining interface, implementing interface, extending interface, **collections -**lists, maps, sets, Queues. **Exception handling:** exception handling fundamentals, exception types, exception hierarchy, try, catch, finally, throw, throws, user defined exception.
UNIT -3	**Multithreading:** Java thread model, working with Thread class and the runnable interface, thread life cycle, thread priorities, inter thread communication, synchronization. **GUI programming- Applet:** creating applet, uses of applet, applet life cycle, inter applet communication, parameters to applet. **Advanced Window Toolkit:** Components and Graphics, window and frame, components-Button, textfield, textarea, label, checkbox,

	radiobutton, etc, layout managers- Border, Grid, Flow, Box, Card, Grid Bag, Containers and Panels.
UNIT -4	**Event handling:** event delegation model, event handling mechanisms, event classes, event listener interfaces, handling events using applets and awt, inner class, anonymous class and Adapter classes. **Swing:** Features of swing, swing components-JButton, JRadioButton, JtextArea, JComboBox, JTable, JProgressBar, JSlider, JDialog, JApplet Exploring controls, menus and layout managers. **Database Connectivity**: Java Database Connectivity (JDBC) architecture, Types of drivers, java.sql package, establishing connectivity and working with connection interface, working with statement, Prepared Statement, Callable Statement interface, working with Result Set interface, methods and fields, Resultset types, working with Result Set Metadata interface, connection pooling, Introduction to Report generation.

Reference Books:

Sr.No.	Title	Author/s	Publication	Edition
1	Core Java – an Integrated approach	Dr. R. Nageswara Rao	Dreamtech Press	2014
2	Object Oriented Programming in Java	Dr. G. T. Thampi	Dreamtech Press	
3	Programming with Java- A Primer	E. Balguruswami	TMH	
4	Core Java	Dr. Shivaji D. Mundhe, Dr. R.D. Kumbhar, Prof. Manoj Sathe	Charlston Publication, Washington USA	1
5	Java 2 Complete Reference	Herbert Schildt & Patric Naughton	TMH	
6	Core Java for beginners	Sharanam Shah & vaishali shah	SPD	5 th
7	A Programmer's Guide to Java (tm) Certification	Khalid Mughal & Rolf W. Rasmussen	PEARSON	
8	Core Java	Rashmi Kanta Das	Vikas Publication	3rd
9	Java 7 Programming- Black Book	Kognet Learning Solutions	Dreamtech Press	

Semester – III				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
19	**MCA303**	**Data Structure using C++**	20	80

Objective:

To learn the systematic way of solving problems, understand the different methods of organizing large amounts of data efficiently. Implement the different data structures and implement solutions for specific problems.

UNIT –1	**Analysis of Algorithms :** Algorithm, Pseudo code for expressing algorithms, time complexity and space complexity, O-notation, Omega notation and theta notation. **Introduction to Data Structure:** Data Management concepts, Data types – primitive and non-primitive, Performance Analysis and Measurement (Time and space analysis of algorithms-Average, best and worst case analysis), Types of Data Structures- Linear & Non Linear Data Structures. ADT – Stack, Queue and List ADT. **Sorting And Searching Techniques :** Bubble, Selection, Insertion, Shell sorts, Quick Sort and Sequential, Binary, Indexed Sequential Searches.
UNIT -2	**Linked List :** Introduction, Concept, Implementation of Linear Linked List, Operation of Linked List - Creation, Display, Insertion, Deletion, Reversing a Linked List, Concatenation of Two Lists, Circular Linked List & Operation, Doubly Linked List & Operation, Doubly Circular Linked List & Operation. **Stack:** Introduction, Definition, Operation on Stack, Implementation of a Stack using array & linked list, Application of Stack - Recursion, Infix, Prefix & Postfix expression, Matching Parentheses in an Expression.
UNIT -3	**Queue:** Introduction, Definition of a Queue, Operation on a Queue, Implementation of Queue, Types of Queue - Circular Queue, Priority Queue, DeQueue, Application of Queue-(First Come First Serve Job Scheduling(FCFS)), Reversing Stack using Queue. **Tree :** Tree Terminology, Binary Tree, Binary Tree Representation, Binary Search Tree (BST), Creating BST, Binary Search Tree Traversal, Tree Traversal Techniques – Pre-order Traversal, In-order Traversal, Post-order Traversal, Operations on BST - Insertion, Deletion.

UNIT -4	**Binary search Tree:** AVL tree, Operations on AVL - Insertion, Deletion and Searching, B tree - introduction to B tree, Operations on B- tree, insertion in B tree, deletion from B tree, Expression Tree, Threaded Binary Tree. **Graph :** Introduction, Graph Representation - Adjacency Matrix, Adjacency List, Graph Traversals - Depth First Search, Breadth First Search, Application of Graph -(Kruskal's algorithm)

Reference Books:

Sr. No.	Title	Author/s	Publication	Edition
1	Data Structure using C and C++	Rajesh K. Shukla	Wiley India	
2	Data Structure using C and C++	Langsam, Augenstein and Tanenbaum	PHI	
3	An Introduction to Data Structures with Applications.	by Jean-Paul Tremblay & Paul G. Sorenson	Tata McGraw Hill	
4	Fundamentals of Computer Algorithms	by Horowitz, Sahni,	Galgotia Pub.	
5	Data structures, algorithms and applications in C++	S. Sahani	University Press india	
6	Fundamentals of Data Structures in C++	By Sartaj Sahani		

Semester – III				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
20	**MCA304**	**Research Methodology**	20	80
Objective: Research is a Tool which helps the Student to Identify, Understand and Solve Management Problems in Future Organization.				
UNIT –1	**Research Introduction :** Meaning, Objectives and Motivation In Research, Types of Research, Research Approaches, Research Process. **Research Design:** Meaning and Significance of Research Designs, Features of a Good Research Design, Types of Research Design, Contents of Research Design.			
UNIT -2	**Hypothesis:** meaning, Hypothesis Formulation, Types of Hypothesis, Characteristics of Good Hypothesis, Testing of Hypothesis, types of hypothesis test.			
UNIT -3	**Sample Design:** Steps in Sample Design, Determining the Size of Sample, Sampling Methods - Simple Random Sampling, Stratified Sampling, Systematic Sampling, Cluster Sampling and Selective Sampling. **Measurement Of Data:** Measurement and Scaling Techniques, Errors in Measurement, Tests of Sound Measurement, Scaling and Scale Construction Techniques. **Data Collection:** Types of Data, Sources of Data– Primary and Secondary Data, Methods of Collecting the Data. Tools For Data Collection: Steps in Questionnaire Design, Characteristics of a Good Questionnaire, Testing the Validity of the Data. Methods- Questionnaire, interview, schedule, mail survey, email/ internet. Testing validity of data. Techniques of interpretation, report writing and layout of report.			
UNIT -4	**Case Studies on research areas in Computer Applications:** Data mining, BigData, Cloud computing, expert system, Knowledge management system, ERP, IS security, AI. **Data Analysis Tools:** Use of SPSS, XL minor, Weka, R language etc. for Data Analysis is recommended.			

Note: Students are expected to prepare a small research project in a group based on above case studies.

Reference Books:

Sr. No.	Title	Author/s	Publication	Edition
1	Research Methodology	G. C. Ramamurthy	Dreamtech Press	
2	Research Methodology-Concepts and Cases	Deepak Chawala, Neena Sondhi	Vikas Publication	
3	Research Methodology Methods & Techniques	C. R. Kothari	New Age International William G. Zikmund Thomson SouthWestern	2 nd
4	Business Research Methods	Donald Cooper & Pamela Schindler	TMGH	
5	Business Research Methods	Alan Bryman & Emma Bell	Oxford Univ press	
6	Projects in Computing and Information Systems(Students Guide)	Christian W. Dawson	Addison Wesley	2005
7	Writing For Computer Science	Justin Zobel	Springer	2004

Semester – III				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
21	**MCA305**	**Enterprise Resource Planning**	20	80
Objective: 1) To know e concepts of BPR and it's need for industry. 2) to understand concept of ERP, evolution, need and significance. 3) to study the ERP implementation life cycle and ERP market.				
UNIT –1	**Business Process Reengineering -** Introduction, Evolution of BPR, Phases of BPR, BPR Challenges, BPR Success factors, Role of IT in BPR.			
UNIT -2	**Unit II- Introduction to ERP –** Enterprise- Overview, Integrated Management Information, Concept of ERP, History and evolution of ERP, Reasons for growth of ERP market, Advantages of ERP, Tangible and Intangible benefits of ERP.			
UNIT -3	**Unit III- ERP Implementation -** ERP Implementation Lifecycle, Risks in ERP implementation,, ERP Implementation Hidden cost, ERP & related Technologies, role of consultant, vendors, Success and failure factors of ERP Implementation, ERP implementation strategies. ERP models Finance, Manufacturing, Human Resource, Plant maintenance, Material Management, Quality Management, Marketing, Sales and Distribution.			
UNIT -4	**Unit I V-ERP Markets** ERP Marketplace & Marketplace dynamics, Market share of various ERP Products, ERP products-SAP, Oracle, JD Edward, QAD Inc, SSA Global, Microsoft, EPICOR etc.			

Reference Books:

Sr. No.	Title	Author/s	Publication	Edition
1	ERP Demystified	Alexis Leon,	Tata McGraw-Hill Education	
2	ERP -	Plak,CarolA.,	Eli Schragenheim (St.LuciePress NY)	
3	Reengineering Corporation –	Mammer, Micheal , Jamis		

		Chambey		
4	Business Process Reengineering –	Jayaraman M.S.	(TMG) (HB SchoolPress)	
5	Best Practices in Reengineering –	Carr D.K. Johnanson H.J.	.(MGH)	
6	Business Process Reengineering: Myth & Reality –	Coulson Thomas C.		
7	The Essence of Business Process Reengineering -	Peppard J, RowlandP.	PH	
8	Process Innovation: Re-engineering Work Through Information Technology –	Davenport T.H	HB SchoolPress	

Semester – III				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
22	**MCA306**	**Communication Skills- II**	50	--
Objective:				
UNIT –1	Unit I Business Communication (15 hours) Essentials of Business Letter (Parts Types) Joining Letter, Application For leave , Application For Transfer, Complaint letter Report writing - Types of Reports, Essentials of Good Report writing			
UNIT -2	Unit II Essentials of Effective Writing (15 hours) C s of effective writing (Correctness, Clarity, Conciseness, Courtesy) Language of Business writing Reader's point of view Business Messages - Routine , Good news, Good will and Bad Messages.			
UNIT -3	Unit III Dialogue Skills (15 hours) Need and Skills (Conversation Skills) Good manners and etiquette Self – Control, - listening, Asking questions. Assertiveness without Aggression Expressing Agreement without being offensive. Feedback Skills.			
UNIT -4	Unit IV Group Communication Meetings – Types, Preparation for a meeting, Conduct And a meeting. Responsibilities of participants. Group Discussion : Meaning, Do's Don'ts of Group Discussion Ingredients of Group Discussion.			

List of books for Reference

1. Professional Communication Skills
   - Er. A.K. Jain, Dr. Pravin S.R.Bhatia., Dr. A.M. Sheikh,
   - S.Chand and Company Ltd. New.Delhi.
2. Business Communication
   -Urmila Rai, S.M. Rai, Himalaya Publishing House , Mumbai (1999)
4. Essential Communication Skills
   - Shalini Aggarwal
5. Business Communication
   - R.K. Madhukar, Vikas Published house Pvt Ltd, New Delhi (2009)
6. Speak well write well
   - Remedial English language Book - Sujatha Rao, Bhaskar Publication, Kolhapur.
7. Spoken English for India, Madras
   - Orient Longman, 1998.
8. A. Handbook of Communication skills
   - R.A.Kulkarni, Phadke Prakashan.

Semester – III				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
23	**MCA307**	**LAB V (Java)**	--	100

Objective:

To impart practical implementation of the Java concepts learned.

	1 WAP to implement class in java.
	2 WAP to perform basic operations on string.
	3 WAP to use various control structures in java.
	4 WAP to use array in java.
	5 WAP to use String Buffer and implement String Builder class.
	6 WAP to implement different ways of accepting input from keyboard. (command line argument and scanner class)
	7 WAP to implement StringTokenizer use for strings in java.
	8 WAP to implement constructor overloading.
	9 WAP to implement use of method overriding.
	10 WAP to implement use of abstract class.
	11 WAP to implement use of access specifier.
	12 WAP to implement use of super keyword.
	13 WAP to implement use of assertion.
	14 WAP to implement use of package.
	15 WAP to implement inheritance.
	16 WAP to implement interface.
	17 WAP to implement arraylist and vector. 18 WAP to implement hashmap and hash table. 19 WAP to implement inbuilt exception handling. 20 WAP to implement user define exception handling. 21 WAP to implement multiple catch. 22 WAP to implement finally keyword. 23 WAP to implement nesting of try .. catch. 24 WAP to implement thread using Thread class. 25 WAP to implement thread using runnable interface. 26 WAP to implement thread priorities. 27 WAP to implement inter thread communication. 28 WAP to implement synchronization.
	29 WAP to implement read a file using stream classes. 30 WAP to implement read a file using reader classes. 31 WAP to implement write a file using stream classes.

	32 WAP to implement write a file using reader classes. 33 WAP to implement copy of a file using stream classes. 34 WAP to implement copy of a file using reader classes. 35 WAP to implement Random Access File. 36 WAP to implement serialization and deserialization.
	37 WAP to implement an applet. 38 WAP to implement applet life cycle. 39 WAP to implement applet for passing a parameter from html.
	40 WAP to implement all layout manager. 41 WAP to implement sample form using panel and frame. 42 WAP to implement all components. 43 WAP to implement event handling mechanism. 44 WAP to implement all events using applet. 45 WAP to implement all events using awt. 46 WAP to implement event handling mechanism using inner classes. 47 WAP to implement event handling mechanism using adapter classes. 48 WAP to implement swing components.
	49 Write a Program using jdbc App to select records from db table. 50 Write a Program using jdbc which check whether connection with Database s/w is established or not. 51 Write a Program using jdbc which shows how to drop a database table. 52 Write a Program using jdbc which shows how to delete records from table. 53 Write a Program using jdbc on scrollable ResultSet. 54 Write a Program using jdbc by using all three jdbc statement objects. 55 Write a program on Parameter Metadata using JDBC. 56 Write a Application on PreparedStatement object using JDBC. 57 Write a program on java App to Excel Communication using JDBC. 58 Write a program on CallableSatement object using JDBC.

Reference Books:

Sr. No.	Title	Author/s	Publication	Edition
1	Core Java – an Integrated approach	Dr. R. Nageswara Rao	Dreamtech Press	2014
2	Object Oriented Programming in Java	Dr. G. T. Thampi	Dreamtech Press	
3	Programming with Java- A Primer	E. Balguruswami	TMH	
4	Core Java	Dr. Shivaji D. Mundhe, Dr. R.D. Kumbhar, Prof. Manoj Sathe	Charlston Publication, Washington USA	1
5	Java 2 Complete Reference	Herbert Schildt & Patric Naughton	TMH	
6	Core Java for beginners	Sharanam Shah &	SPD	5 th

		vaishali shah		
7	A Programmer's Guide to Java (tm) Certification	Khalid Mughal & Rolf W. Rasmussen	PEARSON	
8	Core Java	Rashmi Kanta Das	Vikas Publication	3rd
9	Java 7 Programming-Black Book	Kognet Learning Solutions	Dreamtech Press	

Semester – III				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
24	**MCA308**	**LAB VI (Data Structure using C++)**	20	80

Objective:

To impart practical implementation of the Data Structure concepts learned.

1. Introduction to pointers. Call by Value and Call by reference.
2. Implement a program for stack that performs following operations using array. (a) PUSH (b) POP (c) PEEP (d) CHANGE (e) DISPLAY

3. Implement a program to convert infix notation to postfix notation using stack.

4. Write a program to implement QUEUE using arrays that performs following operations (a) INSERT (b) DELETE (c) DISPLAY

5. Write a program to implement Circular Queue using arrays that performs following operations. (a) INSERT (b) DELETE (c) DISPLAY

6. Write a program to implement priority Queue using arrays that performs following operations. (a) INSERT (b) DELETE (c) DISPLAY

7. Write a menu driven program to implement following operations on the singly linked list.
   (a) Insert a node at the front of the linked list.
   (b) Insert a node at the end of the linked list.
   (c) Insert a node such that linked list is in ascending order.
   (d) Delete a first node of the linked list.
   (e) Delete a node before specified position.
   (f) Delete a node after specified position.
8. Write a program to implement stack using linked list.
9. Write a program to implement queue using linked list.
10. Write a program to implement following operations on the doubly linked list.
    (a) Insert a node at the front of the linked list.
    (b) Insert a node at the end of the linked list.
    (c) Delete a last node of the linked list.
    (d) Delete a node before specified position.

11. Write a program to implement following operations on the circular linked list.
    (a) Insert a node at the end of the linked list.
    (b) Insert a node before specified position.
    (c) Delete a first node of the linked list.
    (d) Delete a node after specified position.

12. Write a menu driven program in C++ to
    a. Create a binary search tree
    b. Traverse the tree in Inorder, Preorder and Post Order
    c. Search the tree for a given node and delete the node
13. Write a program in C++ to implement insertion and deletion in AVL tree
14. Write a program in C++ to implement insertion and deletion in B tree

15. Implement recursive and non-recursive tree traversing methods inorder, preorder and post-order traversal.

16. Write a program to implement Quick Sort
17. Write a program to implement Selection Sort
18. Write a program to implement Bubble Sort
19. Write a Program to implement Insertion Sort.
20. Write a Program to implement Shell Sort.
21. Write a program to implement linear sequential Search.
22. Write a program to implement Binary Search.

23. Write a program in C++ to insert and delete nodes in graph using Adjacency matrix and Adjacency list.
24. Write a program in C++ to implement Breadth First search using linked representation of graph.
25. Write a program in C++ to implement Depth first search using linked representation of graph.
26. Write a program in C++ to create a minimum spanning tree using Kruskal's algorithm.

Open Ended Problem:
1) Simulate a simple dictionary. Assume each character contains at least 10 vocabularies. Create an index page for all characters. Retrieve the word using index value. Assume that the index characters from a to z.

2) Design a simple search engine to display the possible websites upon entering a search query. Use suitable data structure for storage and retrieval.

3) Design and Develop the index for a text book of at least 100 pages using alphabets.

4) Design a Student Prerequisite Subjects Management System requires the use of linked list or tree to store different courses and their prerequisites and based on this list it will allow any student to take any course or not.

5) Write a program that to sort 1000 random digits. Print the data before and after the sort. Each sort bucket should be a linked list. At the end of the sort, the data should be in the original array.

Reference Books:

Sr. No.	Title	Author/s	Publication	Edition
1	Data Structure using C and C++	Rajesh K. Shukla	Wiley India	
2	Data Structure using C and C++	Langsam, Augenstein and Tanenbaum	PHI	
3	An Introduction to Data Structures with Applications.	by Jean-Paul Tremblay & Paul G. Sorenson	Tata McGraw Hill	
4	Fundamentals of Computer Algorithms	by Horowitz, Sahni,	Galgotia Pub.	
5	Data structures, algorithms and applications in C++	S. Sahani	University Press india	
6	Fundamentals of Data Structures in C++	By Sartaj Sahani		

Semester - IV				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
25	**MCA401**	**Mobile Computing**	20	80
Objective: To develop an understanding of how to design, develop, and deploy android based applications for mobile devices and basics of Mobile Computing.				
UNIT –1	**Concept of Mobile Communication:** Different generations of wireless technology, Understanding GSM and CDMA, Architecture, Characteristics and Different modes used for Mobile Communication, Application of Mobile Communication, Mobile IP,, Basic Mobile Computing Protocol **Android Operating System -**Open Handset Alliance, Android Ecosystem, Android Versions, Features of Android, Architecture & Environment, SDK, Android Development Tools, Android Virtual Devices, Emulators, Dalvik Virtual Machine, Android Directory Structure			
UNIT -2	**Android Application Components-** Android Activity, Android Intent, Types of Intents, **Android User Interface** -Model View Controller, Layouts, Fragments, Views ,Event driven Programming in Android (Text Edit, Button clicked etc.) Activity Lifecycle **Android Toast, Menu, Dialog, List and Adapters** : Menu :Basics, Custom v/s System Menus, Create and Use Handset menu Button (Hardware), Dialog : Creating and Altering Dialogs, Toast : List & Adapters **SQLite Database** :SQLite Database, Creation and connection of the database, SQLite , Transactions			
UNIT -3	**Location and Mapping:** Location based services, Interacting with GPS, Mapping, MapView and MapActivity **Android Camera and Telephony Classes** - Classes needed for Camera, Interfacing Camera, Simple Phone calls, Android telephony Packages, Android telephony Internals **Deploying an Application:** creating .apk files, Demo Application Development and Launching , Web Browser Application, Connectivity Application , Deploy Applications onto Phone, Selling the application.			
UNIT -4	**iOS Application Development :** - Introduction to iOS, iOS Versions, iOS Layers, iOS Features, iOS architecture. Xcode and interface builder - introduction to IDEs, Xcode IDE , Introduction to IB (Interface Builder), Working with Xcode and IB. , Obj-C vs. C++ , Classes and Objects **User Interface :** Cocoa & MVC model - Introduction to Cocoa Touch, View based applications: Delegates, Controllers, IBOutlets. UI Design, Core Media: audio, still photos and video., Uploading to the app store.			

Reference Books:

Sr. No.	Title	Author/s	Publication	Edition
1	Android Application Development -BlackBook	Pradip Kotari	Dreamtech	
2	Composing Mobile Apps-Learn, Explorer, Apply using Android	Anubhav Pradhan, Anil Deshpande	Wiley	
3	Android	P.K. Dixit	Vikas publication	
3	Beginning Android 4 Application Development	Wei-Meng Lee	Wiley India Pvt Ltd.	
4	Beginning Android	Mark L Murphy	Wiley India Pvt Ltd.	
5	Pro Android	Sayed Y Hashimi and SatyaKomatineni -	-Wiley India Pvt Ltd.	
6	Beginning iOS programming-building and deploying iOS app	Nick Harris	Wrox Publication	

Semester – IV				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
26	**MCA402**	**Advance Java**	20	80

Objective: To through the Students with the advanced concepts and make them learn to produce well designed, dynamic Web applications. Students can get a cutting edge to latest technologies, tools and frameworks related to java as per the industry requirements.

UNIT –1	**Networking with Java** Networking basics -Sockets, port, Proxy servers, Internet addressing, URL, java.net – networking classes and interfaces, Implementing TCP/IP based Server and Client, Datagrams – Datagram packet, Datagram server and client, URL connections, Developing small application with sockets **RMI -** Introduction & Architecture of RMI, Stubs & skeleton, Java rmi classes and interfaces Writing simple RMI application, Parameter passing in remote methods (marshalling and unmarshalling) **Java Beans -** Introduction, advantages, JavaBeans API, Using the Bean Development Kit (BDK), Introduction to Jar and manifest files, design pattern, Writing simple bean.
UNIT -2	**Servlets:** Introduction, Servlet vs. CGI ,Tomcat/Web logic Configuration, directory structure for a web Application, Servlet API Overview, Writing and running Simple Servlet, Servlet Life Cycle, GenericServlet and HttpServlet, ServletConfig & ServletContext; Writing servlet to Handle Get and Post Methods, Reading user request data, Http Tunneling, Concept of cookie, Reading and writing cookies, Need of Session Management. Types of Session management, Request Dispatcher Servlet & JDBC, Writing thread safe servlets, Introduction to Servlet Listeners. creating a web application(using netbeans) **Java Server Pages-:** Why JSP?,JSP Directives, JSP API, JSP v/s Servlet, Life cycle of JSP, Writing simple JSP page, Scripting Elements, Default Objects in JSP, JSP Actions, Managing Sessions using JSP, JSP with beans, JSP & Databases, Error Handling in JSP. **Advanced JSP:** Java Beans and JSP, Different scopes in a JSP page, custom tag handling, JSP Tag Extensions, Integrating JSPTL into JSP pages
UNIT -3	**Java Server Faces** : J2SE Vs J2EE ,The MVC architecture, Need of MVC , what is JSF?, components of JSF, JSF as an application, JSF lifecycle, JSF configuration, JSF web applications (login form, JSF pages) **EJB:** Enterprise bean architecture, Benefits of enterprise bean, types of beans, Accessing beans , packaging beans, creating web applications, creating enterprisebean, creating web client, creating JSP file, building and running web application.

UNIT -4	**STRUTS**: Introduction to Struts 2 Framework, Framework Overview, Struts architecture,Struts classes - ActionForward, ActionForm, ActionServlet, Action classes Understanding struts-config.xml, Understanding Action Mappings, Struts Validation Framework, Struts <s:form/> components overview. (s:checkbox,s:textfield etc….), Model driven concept, Message handling Struts flow with an example application. **Hibernate-** Introduction to ORM, Introduction to Hibernate, Hibernate, Object Life cycle, Hibernate configuration, file and mapping files, Session operations, Hibernate strategies.

Note: Students are allowed to use any IDE for application development.

Reference Books:

Sr. No.	**Title**	**Author/s**	**Publication**	**Edition**
1	Advanced Java Technology	Prof. M. T. Savaliya	Dreamtech Press	
2	Java server Programming Java EE7 Black Book	Kongent Learning	Dreamtech	
3	Java All-In-One Desk Reference For Dummies	Doug Lowe	WILEY	2nd
4	Java 2 Programming Little Black Book	Alain Trottier	PARAGLY	--
5	Inside Servlets	Dustine R. Callway	PEARSON	--
6	Struts: The Complete Reference	James Homes	TMH	2nd
7	Professional Java Server Programming	Simon Brown	WROX	2nd
8	Struts 2 for beginners	Sharanam Shah and vaishali shah	SPD	--
9	JSP complete reference	Hanna & Phil	WILEY	--
10	Struts 2	P.K.Dixit	Vikas	

Semester – IV				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
27	**MCA403**	**Advance Database Technology**	20	80
Objective: : To understand advanced database concepts with data warehousing, data mining, distributed and parallel databases and also to learn XML database concept.				
UNIT –1	**Advance Database Management System** – Concepts & Architectures, Centralised, Client-Server , Server system - Transaction servers , Data servers , Cloud based servers **Object Oriented and Object Relational Database-** Need of OODBMS, Storing Objects in Relational Database, Introduction to OO Data Models, Persistent Programming Languages , Nested Relational Model			
UNIT -2	**Data Warehousing And Data Mining** Introduction to Data warehousing, Multidimensional Model, Multidimensional Schema-Star Schema, Snowflake Schema, Fact Constellation, Introduction to Data Mining and KDD, Rule and Algorithms 0f Classification, Clustering and Association			
UNIT -3	**Distributed and Parallel Database** Introduction to Parallel databases, Parallel: Query Evaluation, Parallelizing Individual operations; sorting, joins, etc. , Introduction to Distributed databases, Data fragmentation and Replication techniques for distributed database design. Query Processing in distributed databases, Concurrency control and Recovery in distributed databases			
UNIT -4	**XML Database:** Structured unstructured and semi structured data., XML hierarchical Data Model, XML Document DTD and XML Schema, XML Documents & databases, XML Query, **Emerging Database Model:** Limitations of Conventional Databases, Multimedia Database, Temporal Databases, Database on the World Wide Web, GIS Data Operations, Digital Libraries			

Reference Books:

Sr. No.	**Title**	**Author/s**	**Publication**
1	Database system concepts', 6th Edition	Abraham Silberschatz, Henry Korth, S, Sudarshan,	(McGraw Hill International)
2	Advanced DBMS	Rini Chakrabarti, S. Dasgupta, Subhash Shinde	Dreamtech
3	Data Mining: Concepts and systems -	Jiawei nan, Micheline Kamber,)	MorganKaufmann publishers

4	Database systems : "Design implementation and management"-	Rob Coronel,	Thomson Learning Press 4thEdition,
5	Database Management Systems -	Raghu Ramkrishnan, Johannes Gehrke	McGraw Hill International 2 nd ed.
6	5. Database Management System	- *Alexis Leaon, Mathews Leon,*	*leon press*
7	6. Fundamentals of Database Systems -	*Remez Elmasri , Shamkant Navathe,*	*Pearson,5th Ed*
8	7. Database Systems – a Practical approach to design , implementation & Management -	*Thomes M. Colnnolly, Carolyn E. Begg,*	*Pearson 4th Ed.*
9			

Semester - IV				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
28	**MCA404**	**Optimization Techniques**	20	80
Objective: To introduce linear programming, Decision analysis, Project Management and related optimization theories to solve real life / simulated problems.				
UNIT –1	**Introduction to Operation Research**- Definition, Scope, applications, limitations and phases of OR. **LINEAR PROGRAMMING PROBLEM.** Introduction to linear programming problem, Formulation of LPP, Standard form, Simplex method, Big-M method, Solution of primal using Dual problem.			
UNIT -2	**ASSIGNMENT PROBLEM:** Definition, mathematical model of assignment problem, balanced & unbalanced assignment problem, Hungarian method for solution of minimization/ maximization, balanced/ unbalanced problems. Travelling salesman problem. **TRANSPORTATION PROBLEM:** Definition, mathematical model of transportation problem, Initial feasible solution by NWCR, Least Cost Method & VAM , Optimality testing by MODI method.			
UNIT -3	**QUEUEING THEORY** Characteristic of Queueing system, Queueing models, problems on (M/M/1:FCFS/∞) model . **SIMULATION TECHNIQUE.** Definition of Simulation, Types of Simulation, Use and limitations of Simulation technique, Generation of random numbers, Monte-Carlo Simulation technique, application of Simulation to queueing theory.			
UNIT -4	**PROJECT MANAGEMENT BY PERT-CPM** Basic definitions, Network diagram presentation, Basic steps in CPM-PERT, Three time estimates, Forward pass computation, Backward pass computations, Determination of float, slack time and Critical path **Decision Theory :** concepts, Decision making under certainty, Decision making under uncertainty- maximax, minimax, maximin, minimin, Laplace criterion, Decision making under risk- EMV, EOL, EVPI scriterion			

Reference Books:

Sr. No.	Title	Author/s	Publication	Edition
1	Operation research	S.D.Sharma		
2	Opertion research – principles and Practices	Ravindran Phillips Solberg	Wiley	
3	Operation research	by Hira and Gupta		
4	Operation Research by	Taha HA.	Prentice Hall	7th
5	Operation Research	Kanti Swarup, Gupta P. K. & Man Mohan	Himalaya Publishing	13th
6	Operations Research	S. Kalavathy,	VIKAS	
7	Operation Research – Theory and Applications	J. K. Sharma	Macmillan India Limited	5th
8	Optimization Methods in Operations Research and System Analysis	Mital K. V.	J. Wiley	2nd
9	Introduction to Operation Research	Research-Hiller F. & Lieberman G. J.	McGraw-Hill	9th
10	Fundamental of Queuing Theory	Gross Donald , Jonh F. Shortle	Wiley	4th
11	Critical Path Method	L.R. Shaffer J.B. Ritter W. L. Meyer	McGraw-Hill	3rd

Semester – IV				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
29	**MCA405**	**Elective- I** **E 1.1 Network Security**	20	80
Objective: To learn understand various network security methods / techniques for protecting data on internet / network.				
UNIT –1	**Security Attacks** (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks. **Conventional Encryption Principles**, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.		
UNIT -2	Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service. **Email privacy:** Pretty Good Privacy (PGP) and S/MIME.		
UNIT -3	**IP Security** Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management. Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).		
UNIT -4	Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats. Firewall Design principles, Trusted Systems. Intrusion Detection Systems.		

Reference Books:

Sr. No.	Title	Author/s	Publication	Edition
1	Network Security Essentials (Applications and Standards)	by William Stallings	Pearson Education.	
2	Hack Proofing your network	Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh,	Wiley Dreamtech	
3	Network Security and Cryptography:	Bernard Menezes,	CENGAGE Learning.	
4	Network Security - Private Communication in a Public World	Charlie Kaufman, Radia Perlman and Mike Speciner,	Pearson/PHI.	
5	Cryptography and network Security,	Stallings,	PHI/Pearson.	Third edition,
6	Principles of Information Security	Whitman,	Cengage Learning	

Semester - IV				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
29	**MCA405**	**Elective- I** **E 1.2 Knowledge Management**	20	80
Objective: To infuse the importance of Knowledge for organizational survival and Success. To train the students on Knowledge Creation, Codification, and Capturing. To empower the students to implement Knowledge Management Systems for organizations				
UNIT –1	**Introduction to KMS** Data, Information, Knowledge, and Wisdom,– KM and KMS – Definitions, and Perspectives – KM Evolution – Limitations of existing initiatives – KM's Value proposition, Market Value and Prosperity – Drivers of KM - Knowledge-centric drivers, Technology drivers, Structural drivers, Process-focused drivers, Economic drivers - Creating Knowledge Edge.			
UNIT -2	**Transmuting Information into Knowledge** From Data to Knowledge – The 5c Process - Classifying Knowledge –- Fundamental Steps – Taming the Tiger's tail – Business and Knowledge – KMS Life Cycle – Challenges in building KMS – Phases in KM Life Cycle,			
UNIT -3	**Design & Development of KM system** Knowledge creation – Nonaka's model of knowledge creation and transformation – Knowledge Architecture – The people core, Identifying Knowledge Centers – The Technical core, Build In-home, buy or outsource model – Capturing Tacit knowledge – Evaluating the Experts – Developing relationship with Experts – The Interview as a tool – Guide to a successful Interview with the Expert, Knowledge Mapping & Knowledge mapping techniques , Knowledge indexing,, Component architecture of KM system			
UNIT -4	**Knowledge Management Strategy & Expert System** KM Strategy-Meaning, need and significance, KM Strategy Phases and Implementation , Knowledge measurement Techniques, K-Careers Concept of AI, AI Applications, Expert System: Introduction, need, advantages and architecture, Applications of Expert system Case Studies on KM applications .			

Reference Books:

Sr. No.	Title	Author/s	Publication	Edition
1	"The knowledge Management Toolkit – Orchestrating IT, Strategy, and Knowledge Platforms",	Amrit Tiwana,	Pearson Education.	Fifth Impression 2009,
2	"Knowledge Management", Fifth Impression	Elias M.Awad & Hassan Ghaziri,	Pearson Education.	2006,
3	"Knowledge Management"	Sudhir Warier,	Vikas Publishin	
4	"The Wealth of Knowledge – Intellectual Capital and the Twenty First Century Organization",	Thomas A. Steward,	Currency Books	
5	"Harvard Business Review on Knowledge Management",	Harvard Review	Paperback Series.-5+3	

Semester - IV				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
29	**MCA405**	**Elective- I** **E 1.3 Information System Audit**	20	80
Objective: To create awareness about the values of Information and how the Information security practices are meticulously implemented in IT companies worldwide. Also to explain different threats, security control mechanisms and auditing tools used to protect IT assets				
UNIT –1	**Introduction To Information Security:** History and Evaluation of Information Security CIA Triangle, Components of IS, Control in IT Environment, Information Security Management System, Components of ISMS and Conceptual Framework, Steps for Developing ISMS, Threats to Information Security, Risk to Information Systems, Information Security in Organization, Introduction to Cyber-Crimes and Attacks, Information Security Policy, Policy Definition and Security Life Cycle, **Protection of Information System:** Need for Protection of Information System, Types of Controls, IT General Control, Logical Access Control and Application Control, Technologies and Security Management Features			
UNIT -2	**Information Security Policies and Standards:** IS a Security Policy, Procedures, Practices Standards and Guideline, IT Control and Control Objective. Segregations of Duties, A Structure and Framework of Compressive Security Policy, Policy Infrastructure, Policy Design Life Cycle and Design Processes, PDCA Model, Security Policy Standards and Practices - BS7799, ISO/IEC 17799, ISO 27001 **IS Controls:** Input, Process, Validation, Output, Logical Access, Physical Access Database, Network, Environment, BCP, Evidence Collection, Evaluation and Reporting Methodologies			
UNIT -3	**Concept Of Governance:** Risk and Compliance, Relationship Between Governance and Management, Role of Information Technology and IS Strategy In Business, Business Value from use of IT, Business Impact of IS Risk, Different types of Information Systems Risk, IS Risk Management Review, IT Compliance Overview-Role and Responsibilities of Top Management As Regards IT-GRC, Role of Information System Assurance, Overview of Governance Framework-COBIT, ITIL,IT Governance Maturity Model **Auditing Of Information System:** Different types of IS Audit and Assurance Engagements, Audit Procedure, Evaluation IT Dependencies for Audit Planning, Overview of Continuous Auditing, Auditing Information Systems-Approach Methodology and Standards			
UNIT -4	**Business Continuity Planning and Controls:** IS Audit Planning, Performing an IS Audit, Best Practices and Standards for IS Audit, Reviewing General Controls, Application Controls, Application Control Review: Review of Control at Various Level's/Layers, Risk Auditing Tools -ISO 27001 ISMS TOOL KIT, NGS AUDITOR,ISO IES 27002 2005 IS audit Tool **Case Studies:** Based on Computer Threats and Security Measures Implementation, Security Control Policies Design, Hardware Software Requirement for Better Security Management			

Reference Books:

Sr. No.	Title	Author/s	Publication	Edition
1	Information System Control and audit	Ron Weber	Pearson Education	3rd Impression 2009
2	Computer security	Alfred Basta, Wolf Halton	Course technology/cengage Learning	2009
3	Information security policies, procedures and standards	Thomas Pettier	M.G. Publication	2nd
4	CISA Review Manual 2012		ISACA	2011
5	Information Systems Security: Security Management, Metrics, Frameworks And Best Practices	Nina Godbole	Wiley India Pvt. Ltd.	1st
6	Information security Management Hand book	Harold F. Tipton	Auerbach publication	5th

Semester - IV				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
29	**MCA405**	**Elective- I** **E 1.4 Social Networking**	20	80
Objective: To create awareness about social media and it's applications to the students.				
UNIT –1	**Web 2.0 and Social Networking** **Web 2.0:** Introduction to Web 2.0, Features of Web 2.0, Application areas: Blogs, Wikis, RSS, Mashups, Podcast, Folksonomies and tagging. **Social Networking**: Definition, Types of Social Networking Sites, Examples of Social Networking Sites: Facebook, Twitter, WhatsApp, etc.			
UNIT -2	**Social Networking Analysis** Attributes and Metrics of Social Networking, Social Networking Models, Data Mining and Analytics of Social Networking, Impact of Social networking on users, Advantages and Disadvantages of Social Networking Sites, Security and Privacy Issues of Social Networking Sites, Legal Issues of Social Networking Sites.			
UNIT -3	**Application Domains of Social Networking** Business Applications: Marketing and HR, Educational Applications, Social and Political Applications, Medical and Health Applications, Current research on Social Networking.			
UNIT -4	**Hands on Practical** **Blogging with WordPress:** Installation of WordPress, To setup Blogging site, WordPress Features: Dashboard, Posts, Media, Links, Pages, Ratings, Users **Social Networking with Joomla:** Setting up a social site using Community Builder, Joomla Features: Membership approvals, Connecting to members, Email communications, Private messages, Report handling and banning / unbanning of profiles			

Reference Books:

Sr. No.	Title	Author/s	Publication
1	Web 2.0: A Strategy Guide	Shuen	Shroff/O'Reilly
2	Social Networking: The Top Social Networking Websites That Help You Build an Online Presence Quickly	Eva Foucher	CreateSpace Independent Publishing Platform
3	Social Networking: Connecting People and Building Relationships	Simantee Sen	The ICFAI University Press
4	Social Media Data Mining and Analytics	Gabor Szabo, Oscar Boykin	Wiley
5	Mining the Social Web	Mattehew A. Russell	Shroff/O'Reilly
6	Professional Wordpress: Design and Development	Brad Williams, David Damstra	Wiely
7	Joomla Bible	Ric Shreves	Wiely

Semester – IV				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
30	**MCA406**	**Mini Project**	**--**	**50**

Objective: To develop a web application using the technologies and scripting students have learnt during the semester.

Project Work:

This mini project is based on subject in semester III and IV. This project will give hand on experience on software development.

- Project must be done in a group of 2 students.
- Use MYSQL, Oracle or SQL Server as a Database.

General Instruction Regarding Preparation Of Project Report

For MCA-II Semester - IV

Typing:

- (a) The typing should be standard 12 pts in 1 ½ spaced using black ink only
- (b) Margins must be Left 2 inches, Right 1.5 inches, Top 2 inches & Bottom 1.5 inches
- (c) Paper A4 size

Project Report Copies:

Each project group should prepare N copies (N=1 Institute copy + m copies, where m indicates number of students in a group).

Format For Title Page:

A

PROJECT REPORT

ON

<TITLE OF THE PROJECT>

FOR THE PARTIAL FULFILLMENT OF

MCA-II, SEM-IV

BY

<NAME OF STUDENT/S>

UNDER THE GUIDANCE OF

<NAME OF GUIDE>

SUBMITTED TO

Shivaji University, Kolhapur

Through

< Principal/Director >

< NAME OF THE INSTITUTE>

<Year>

Project Report Contents:

2 Blank pages at the Beginning

- Title Page
- Project Completion Certificate
- Declaration
- Acknowledgement
- CONTENTS with printed Page Numbers

CHAPTER 1: INTRODUCTION

1.1 Existing System and Need for System

1.2 Scope of Work

1.3 Operating Environment – Hardware and Software

1.4 Detail Description of Technology Used

CHAPTER 2: PROPOSED SYSTEM

2.1 Proposed System

2.2 Objectives of System

2.3 User Requirements

CHAPTER 3: ANALYSIS & DESIGN

3.1 UML Diagrams

- Use case
- Class
- Object
- Sequence
- Activity
- Component
- Deployment

3.2 Table Specifications (Design)

3.3 Menu Tree(Web Site Map)

3.4 User interface Design (Screens etc.)

3.5 Report Formats(Optional)

CHAPTER 4: USER MANUAL

4.1 Operations Manual / Menu Explanation

4.2 Program Specification / Flow chart

DRAWBACKS AND LIMITATIONS

PROPOSED ENHANCEMENTS

CONCLUSION

BIBLIOGRAPHY

ANNEXURES:

ANNEXURE 1: USER INTERFACE SCREENS

ANNEXURE 2: OUTPUT REPORTS WITH DATA (if any)

ANNEXURE 3: SAMPLE PROGRAM CODE (which will prove sufficient development is done by the student)

2 blank pages at the end

Semester – IV				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
31	**MCA407**	**LAB VII (Advance JAVA)**	**--**	**100**
Objective: To impart practical implementation of the advance java concepts learned.				

Lab demonstrations are expected on following topics –

Sr. No	**Title**
1.	WAP to implement URL and Inetaddress.
2.	WAP to implement client and server using TCP/IP and datagram.
3.	WAP to implement multichat server.
4.	WAP to implement RMI.
5.	WAP to implement Servlet for displaying Hello.
6.	WAP to implement Servlet to take values from client and display it.
7.	WAP to use HttpServlet, GenericServlet.
8.	WAP to implement Session Management using all Four types.
9	WAP to use Http Response and Http Request.
10	WAP to implements ServletConfig and ServletContext.
11	WAP to use JDBC with Servlet.
12	WAP to use Servlet Listeners
13	WAP to implement use of JSP Directives.
14	WAP to implement use of Actions.
15	WAP to implement session.
16	WAP to implement JSP using JDBC
17	WAP to implement error handling.
18	WAP to demonstrate use of expression language.
19	WAP to demonstrate use of custom tags.
20	WAP to demonstrate use of MVC
21	WAP to implement Session bean, Entity bean and Message Driven bean.
22	WAP to implement simple hello example using struts and eclipse.
23	WAP to Demonstrate a program in struts that uses Action Class
24	WAP to Demonstrate a database application in struts

Semester – IV				
Sr. No.	**Subject Code**	**Subject Title**	**Internal Marks**	**External Marks**
32	**MCA408**	**LAB VIII (Mobile Computing and ADBT)**	**--**	**100**
Objective: To impart practical implementation of the Mobile Computing and ADBT concepts learned.				

Lab demonstrations are expected on following topics –

Sr. No Title
Mobile Computing
1. Java Android Program to Build a Simple Android Application
2. Java Andorid Program to Demonstrate Usage of String.xml File
3. Java Andorid Program to Demonstrate Activity Life Cycle
4. Java Android Program to Change the Background of your Activity
5. Java Andorid Program to Perform all Operations using Calculators
6. Java Android Program to Change the Image Displayed on the Screen
7. Java Android Program to Create Multiple Activities within an Application
8. Java Android Program to Demonstrate Action Button by Implementing on Click Listener
9. Java Android Program to Demonstrate the use of Scroll View
10. Java Android Program to Demonstrate Radio Group Application
11. Java Android Program to Demonstrate Alert Dialog Box
12. Java Android Program to Demonstrate the Menu Application
13Java Android Program to Demonstrate Toast in an Application
14. Java Android Program to Demonstrate List View Activity
15. Java Android Program to Demonstrate Layouts in an Activity and Nesting of Layouts
16. Java Android Program to Demonstrate Touch Listener
17. Java Android Program to Demonstrate a Simple Video View
18. Java Android Program to Demonstrate a Simple to do List Application
19. Java Android Program to Demonstrate Explicit Intent
20. Java Android Program to Demonstrate Implicit Intent
21. Java Android Program to Demonstrate Intent Filter
22. Java Android Program to Demonstrate Connection to an Internet Resource
23. Java Android Program to Demonstrate Google Maps in Andorid
24. Java Android Program to Demonstrate Reading a File on SD Card
25. Java Android Program to Demonstrate Reading and Writing to a File in Android
26. Java Android Program to Write to a SQLite Database in Android
27. Java Android Program to Read and Write to a SQLite Database in Android
28. Java Android Program to Read Write and Delete to a SQLite Database in Android
29. Java Android Program to Demonstrate a Full Screen Activity
30. Java Android Program to Change an Activity's Icon
31. Java Android Program to Demonstarte Menu Groups in Android
32. Java Android Program to Demonstrate Date Picker Dialog in Android
33. Java Android Program to Demonstrate Character Picker Dialog in Android
34. Java Android Program to Demonstrate Time Picker Dialog in Android

35. Java Android Program to Demonstrate Progress Dialog in Android
36. Java Android Program to Demonstrate Progress Dialog with Spinning Wheel in Android
37. Java Android to Record Media Using Media Recorder
38. Java Android Program to Send and Receive Data From Server
ADBT
1. Introduction about launching the Weka tool.
2. Introduction to Weka Explorer.
3. Introduction to the classification of Mining techniques.
4. perform Preprocessing, Classification and Visualization techniques on Customer dataset.
5. To perform Clustering technique on Customer dataset.
6. To perform Association technique on Customer dataset.
7. To perform all the techniques on Friends dataset.